Alaska Iways Architecture Update

Task 2 (Part 6 of 6):
Chapter 6: ITS Implementation Plan

FINAL

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TABLE OF CONTENTS

LIST OF TABLES

6 IMPLEMENTATION PLAN

6.1 Introduction

This Implementation Plan is the last in the series of six chapters that comprise the body of Alaska's Iways Architecture. The Implementation Plan focuses on implementing the statewide ITS strategies identified in the previous chapters, over the near- (0-3 years), mid- (3-5 years), and long-term (5-10 years). It fully considers the resources available for implementing ITS technologies, previous, on-going and planned ITS activity, and the State's existing and planned ITS elements.

ITS elements associated with projects phased for implementation and discussed later in this chapter should be reflected in the Alaska Iways Architecture. Every effort has been made to include potential ITS elements in the Alaska Iways Architecture already, however, projects may evolve over time necessitating that the architecture be revisited to include newly identified ITS elements. Therefore, before any new ITS project is funded, officials need to determine whether or not the proposed ITS project fits into the Iways Architecture. If all aspects of the project are completely covered then no action is needed and the project can be implemented. However, if some or all aspects are not accounted for in the Architecture, then a determination should be made of whether or not the project actually satisfies a transportation need for the region. If so, then the ADOT&PF will need to update the Statewide IWAYS Architecture to include the new ITS project, or the ITS elements associated with the project.

In addition to this Statewide ITS implementation Plan, the Alaska Department of Transportation and Public Facilities (ADOT&PF) also completed similar ITS Implementation Plans for the segments of the Glenn and Seward Highways in and near Anchorage. The effort to develop the Glenn and Seward ITS Implementation Plans was a task associated with the Iways Architecture update project, however the Highway Plans attempt to provide more detailed information pertaining to these specific segments of highway. These two segments were selected based on on-going ITS activities and interest in deploying ITS. Over the last several years many ITS projects have either been deployed or are planned for the Glenn and Seward Highways. Due to this interest in ITS the ADOT&PF decided to develop these area-specific ITS Plans so ITS implementation can be better planned and occur in a controlled, effective manner. This update to Alaska Iways Architecture, and specifically this ITS Implementation were updated in parallel to the Glenn and Seward ITS Implementation Plans. Therefore, this Implementation Plan takes into consideration the ITS projects identified in these corridor plans when recommending a statewide approach for implementing ITS projects. Due to their relative location to Anchorage, the majority of statewide ITS projects are derived from the Glenn and Seward ITS plans.

6.1.1 Purpose

The purpose of this ITS Implementation Plan is to identify and phase for implementation the technological solutions identified to address Alaska's transportation needs and desires. The ITS Implementation Plan defines a set of projects proposed for implementation in Alaska over the next ten years, and provides the criteria used to prioritize these projects. It also discusses project selection

methodology, funding opportunities, procurement options, and integration strategies. Integration, as it pertains to implementing ITS, refers to deploying ITS into a system that supports multiple user needs. There are varying levels of integration, ranging from data exchange between stakeholders to the intra-agency control of a stakeholder's infrastructure.

In the near-term, resource constraints would make it difficult for ADOT&PF to implement all the systems that would help fulfill Alaska's ITS Long-Range Vision. ITS projects must compete for funding with more traditional transportation, construction, and improvement projects. Because of this, phased ITS implementation will prove effective and help the ITS technologies identified in the Implementation Plan meet both ADOT&PF and Alaska travelers' diverse and unique needs.

By phasing projects, ITS implementation can occur in a controlled, cost effective, and efficient manner, allowing benefits to be realized in the near-term while providing the foundation needed to implement larger, more complex projects with additional benefits in the long-term. Phasing projects serves as a way to sequence projects so that they build off each other and are based on need, available funding, and institution agreement and cooperation. For instance a Traffic Management Center will yield little benefit if implemented in the near-term if the communications, detection, and surveillance systems were not in place first to allow TMC operators the ability to monitor roads and communicate conditions with other agencies. This Plan phases or sequences projects for implementation over the near- (0-3 years), mid- (3-5 years), and long-term (5-10 years), focusing on obtaining benefits in the near-term while supporting larger, more complex projects with greater benefits in the long-term.

6.2 Embracing a Structured Approach for Implementing ITS Projects

ITS project implementation should follow a common, structured approach to ensure that ITS projects are implemented in similar, consistent, and cost effective fashion. Such an approach also reduces the risk of schedule and cost overruns and increases the likelihood that the implementation will meet the user's needs. Other benefits of a structured approach for implementing ITS projects include:

- improved stakeholder participation,
- more adaptable, resilient systems,
- verified functionality and fewer defects,
- higher level of reuse from one project to the next, and
- better documentation.

One approach that is gaining popularity among ITS professionals is a process known as Systems Engineering.

6.2.1 What is System's Engineering

The Systems Engineering Process ensures that the subsystems proposed for implementation meet the needs and requirements defined in the early stages of a project. There are multiple ways to represent the Systems Engineering Process. One way, the Systems Engineering "V" diagram (see Figure 6-1), represents the typical life cycle of any subsystem or project. Each step in the process represents a "bite-sized" portion of the entire process that individuals can easily "digest" to better manage the intricacies of subsystem implementation. Alaska's Statewide Iways Architecture represents the first step in this process. ITS projects should fall out of this first step, and should follow the steps of the "V" diagram from left to right. It should be noted that the steps in the "V" diagram are intended for individual projects. The Alaska Iways Architecture process completes several of these steps, but at a much higher level of detail. When a project from the Iways Architecture is recommended for implementation, individuals responsible for overseeing the project should expand upon the details of the architecture by following the steps of the "V" diagram.

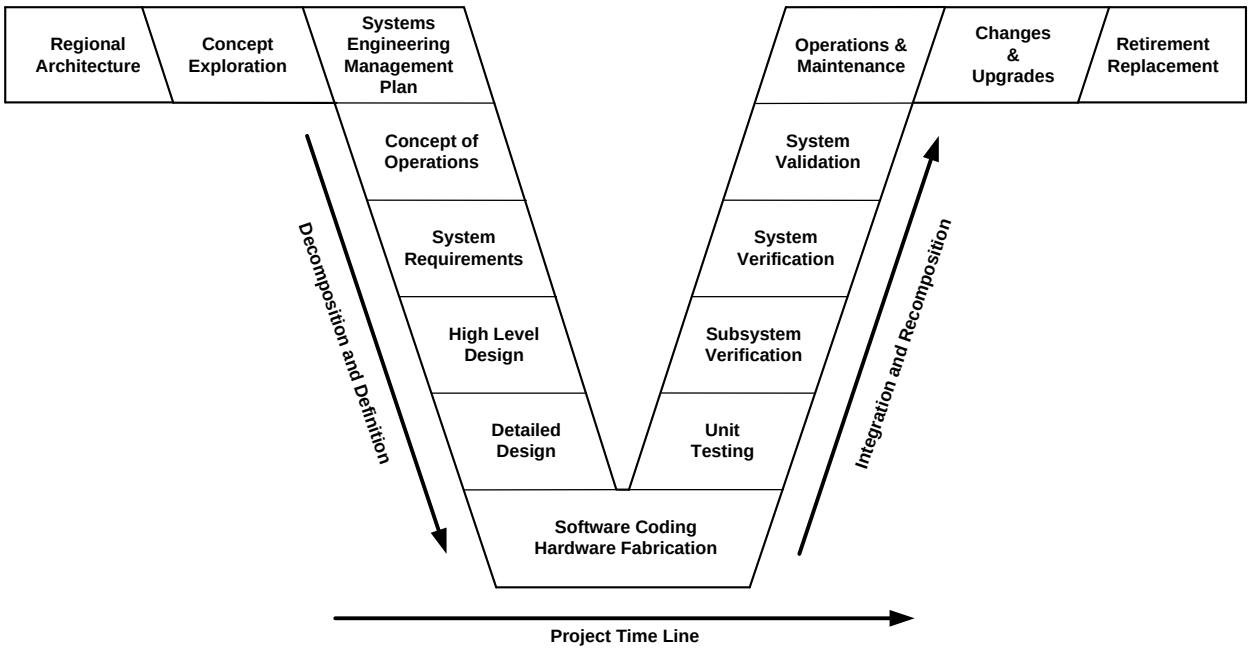

Figure 6-1: Systems Engineering "V" Diagram

The FHWA Systems Engineering for Intelligent Transportation Systems Handbook provides additional information on the Systems Engineering Process, including a brief discussion of the steps leading to project implementation. This publication can be found at:

http://ops.fhwa.dot.gov/publications/seitsguide/index.htm

It is highly recommended that individuals responsible for project implementation reference this document so they can ensure that their project meet requirements and that funding for projects can be secured.

6.2.2 Federal Policy

The FHWA Rule/FTA Policy requires that a system engineering analysis be performed for ITS projects that use funds from the Highway Trust Fund, including the Mass Transit Account. This includes both standalone ITS projects and projects containing ITS elements. According to the Final Rule, the system's engineering analysis should be developed to an extent similar to the project scope and meet the following requirements:

- Identify portions of the regional architecture being implemented,
- Identify of participating agency roles and responsibilities,
- Identify requirements definitions,
- Analyze alternative system configurations and technology options to meet requirements,
- Identify procurement options,
- Identify applicable ITS standards and testing procedures, and
- Outline procedures and resources necessary for operations and maintenance.

6.2.3 ADOT&PF Policy

Per the requirements of the Federal Policy and the expected benefits of a systems engineering approach, ADOT&PF requires that project champions demonstrate that their ITS projects or projects containing ITS elements comply with the systems engineering approach before projects are approved and implemented

with monies from the Federal Highway Trust Fund. To help project champions understand these requirements, and to expedite this process as much as possible the Department has developed the following website:

http://www.dot.state.ak.us/iways/sys-eng.shtml

This website provides a system engineering checklist that project champions must fill out and submit prior to project implementation. Included with this checklist are step–by-step directions for satisfying each requirement. In addition to the Alaska systems engineering checklist and instructions, the website also provides general information on the systems engineering process, requirements, and benefits. Included in this information are examples of projects that are considered ITS and therefore subject to the requirements of the systems engineering process.

6.3 Aligning with U.S. DOT Major ITS Initiatives and Programs

When making decisions regarding the implementation of ITS in Alaska, the ADOT&PF should take into consideration ITS activity and efforts occurring on the national level. National ITS activities may constitute areas of increased funding and development. Aligning with these activities may place ADOT&PF and the State of Alaska in a position to actively engage in these activities and to benefit from efforts to promote them. For instance, the FHWA may select locations throughout the country to test and demonstrate initiatives and technologies associated with achieving stated goals and directives. This may present an opportunity to receive federal funding to implement ITS-related technology that satisfies one or more of the State's stated transportation needs. The following sections briefly discuss major ITS initiatives and programs that may have an impact on the growth of Alaska's Iways Program as it evolves in the future.

6.3.1 Major ITS Initiatives

The U.S. Department of Transportation has initiated a set of major ITS initiatives that directly address the congressional goals, purposes, and priorities set forth in SAFETEA-LU. The current program focuses on nine initiatives that align with the Department's goals for safety, reduced congestion, and economic productivity. The initiatives build off the foundation of ITS activities currently and previously conducted throughout the nation. It is expected that as progress is made toward satisfying these initiatives, the products that result will further create new ITS initiatives that will form the basis for ITS development and deployment in the future.

Aligning ITS project implementation with National ITS Initiatives may make it easier to secure funding for ITS, as it is likely that additional funding opportunities will be made available to support these national efforts. Each initiative is briefly described below. Additional information on each of these initiatives can be found at:

http://www.itsdocs.fhwa.dot.gov/JPODOCS/REPTS_TE/14289/plan2-5.htm

Cooperative Intersection Collision Avoidance Systems

Intersection collision avoidance systems use both vehicle-based and infrastructure-based technologies to help drivers approaching an intersection understand the state of activities within that intersection. Cooperative intersection collision avoidance systems (CICAS) have the potential to warn drivers about likely violations of traffic control devices and to help them maneuver through cross traffic. Eventually, CICAS may also inform other drivers (i.e., potential victims) about impending violations as well as identify pedestrians and cyclists within an intersection.

Emergency Transportation Operations

The Emergency Transportation Operations initiative is designed to support these types of incidents. The outcome of this initiative will be the tools, techniques, demonstrated benefits, technical guidance, and standards necessary for state and local agencies and their private sector partners to effectively manage "no notice" evacuations.

Mobility Services for All Americans

The Mobility Services for All Americans initiative will build upon several past and current USDOT-led activities to increase mobility and accessibility for the transportation disadvantaged and the general public, and achieve more efficient use of federal transportation funding resources through technology integration and service coordination.

Integrated Corridor Management Systems

Through the Integrated Corridor Management Systems initiative, the USDOT will provide guidance to assist agencies in implementing Integrated Corridor Operations, create supporting analysis tools, approaches, and technical standards, and demonstrate the value of Integrated Corridor Management.

Integrated Vehicle Based Safety Systems

Through the Integrated Vehicle Based Safety Systems initiative, the USDOT is seeking to establish a partnership with the automotive, commercial vehicle, and transit vehicle industries to accelerate the introduction of integrated vehicle-based safety systems into the Nation's vehicle fleet.

Nationwide Surface Transportation Weather Observing and Forecasting System – *Clarus*

The activities of the Nationwide Surface Transportation Weather Observing and Forecasting System – *Clarus* initiative will develop and demonstrate an integrated surface transportation weather observing, forecasting and data management system, and establish a partnership to create a Nationwide Surface Transportation Weather Observing and Forecasting System. The objective of the *Clarus* Initiative is to create an integrated network of weather sensors and instrumentation to allow for the seamless sharing of information across jurisdictional boundaries and state borders. This will allow travelers, transportation managers, and weather providers to access more precise, relevant and timely atmospheric and road weather information. This in turn will provide the following benefits:

- Improve decision making
- Reduce consumption of resources
- Reduce weather-related collisions

The State of Alaska is a lead *Clarus* state, and 1 of 3 regional demonstration teams.

Next Generation 9-1-1

The nation’s current 9-1-1 systems are limited in the manner in which they can handle text, data, images, and video. They are also limited in the types of communications devices they can interface. For instance, many of today’s 9-1-1 systems cannot adequately handle digital communications networks as well and wireless communications. The Next Generation 9-1-1 (NG 9-1-1) initiative seeks to phase out and replace existing, out-of-date 9-1-1 systems, so that 9-1-1 systems can adequately interface and handle information from today’s various types of communication technologies. When implemented next generation 9-1-1 systems will be able to use text, data, images and video from a variety of communications technologies to improve emergency response and better preserve the security of transportation networks.

Universal Electronic Freight Manifest

The Electronic Freight Manifest Initiative seeks to improve operational efficiency, productivity and security by establishing a common electronic freight manifest. In doing so, this initiative will improve speed, accuracy, and information transfer when freight is transferred from one mode to another. It will also reduce redundancies in manual entry of manifest data, and will reduce paperwork associated with freight movement. The need for this initiative is fueled from growing freight volumes.

Vehicle Infrastructure Integration (VII)

The goal of VII is to provide a communications link between vehicles on the road and between vehicles and roadside infrastructure in order to increase the safety, efficiency, and convenience of the transportation system. Additionally, VII presents the potential to better understand traffic characteristics and patterns, through constant communication between the vehicle and roadside or other vehicles. The initiative is supported by wireless communication, specifically Dedicated Short Range Communications (DSRC) - a tool approved for licensing by the FCC in 2003. Among many other possibilities, the Vehicle Infrastructure Integration initiative will help keep vehicles from leaving the road and enhance safe movement through intersections.

6.3.2 Real-Time System Management Information Program

Section 1201 of SAFETEA-LU established a Real-Time System Management (RTSM) Information Program to provide the capability to monitor, in real-time, the traffic and travel conditions of major highways in the United States. The intent of the program is to share collected travel and traffic conditions information with state and local governments as well as the general public, in an overall effort to reduce congestion. It is FHWA's intent to require individual States to establish a real-time information program to reduce congestion though the provision of traffic and travel conditions information. States will be required to have a real-time information program in place within 2 years after the release of the RTSM Final Rule. To date the USDOT has not released its Final Rule so states are not yet required to implement real-time information programs; however, it is beneficial to incorporate guidance if applicable, so the risks associated with system development and implementation can be minimized. It is anticipated that the RTSM Final Rule will be released in late 2009 or early 2010.

On October 15, 2007, the USDOT released its publication of interim guidance on the Information Sharing Specifications and Data Exchange Formats for the Real-Time System Management Information Program. Additionally, on January 14, 2009 the USDOT released its Notice of Proposed rulemaking (NPRM) concerning the RTSM. Together the interim guidance and the NPRM lay out to State and local governments the minimum parameters and requirements for making available and sharing real-time traffic and travel condition information and data.

Per guidance stated in the NPRM, states will be required to establish RTSM programs in 2 stages. The first stage, which is to be completed within 2 years of release of the Final Rule on RTSM is directed at reporting traffic and travel conditions along Interstate highways. The second stage, which is to be completed within 4 years of the Final Rule release, is directed at reporting traffic and travel conditions along metropolitan area, non-intestate highways. Per the NPRM, a metropolitan area is defined as one with population greater than 1 million. Therefore, at this time it appears that Alaska, with a state population just over 670,000, will only be subject to the first stage of establishing the RTSM. ADOT&PF should confirm this understanding with their state FHWA representative.

Although Alaska does not have any interstate highways per se, there are state highways that are treated like interstate highways in terms of Federal funding requirements and obligations. In Alaska, this includes the following urban and rural highways. Only the segments of each highway (and corresponding ramps) that fall between the Milepoints (Mpt) indicated are applicable to the NPRM on RTSM. Milepoint is an internal mile reference system that ADOT&PF use in the Highway Analysis System.

- Seward Highway (Mpt 36.497 to Mpt 125.297)
- Glenn Highway (Mpt 0 to Mpt 180.115)
- Parks Highway (Mpt 0 to Mpt 323.688)
- Richardson Highway (Mpt 117.588 to Mpt 131.591 and Mpt 268.673 to Mpt 361.878)
- Sterling Highway (Mpt 0 to Mpt 57.175)
- Alaska Highway (Mpt 0 to Mpt 197.635)
- Tok Cutoff Highway (Mpt 0 to Mpt 122.377)

Therefore, upon release of the Final Rule on RTSM ADOT&PF will be required to establish a RTSM for reporting traffic and travel conditions along the above listed highways. It is anticipated that the state's 511 program will be leveraged to a large extent to meet this requirement. Additionally, it is believed that the RTSM will not explicitly require States to deploy additional systems to collect data, but rather establish standardized interfaces (center-to-center) that provide the capability to share relevant information already being collected by existing infrastructure. Over time, as additional systems are deployed along these highways, standardized interfaces can be used, thereby allowing these technologies to be easily integrated with others already included and part of the RTSM.

The types of information required to be reported for these highways are:

- Traffic incidents that block roadway travel
- Roadway weather conditions, and
- Construction activities affecting travel conditions.

The NPRM specifies that the information types listed above be available and accurate a minimum of 90% and 85% of the time, respectively. Additionally, it is proposed that the information be provided no later than 20 minutes after the time of occurrence (non-metropolitan areas).

In addition to the proposed information types listed above, states may be required to report transit event information if there is support to do so and the FHWA includes this in the Final Rule. FHWA has requested comments on the viability and practically of including transit event information as an explicit requirement of the RTSM. Based on previous comments received there appears to be little interest and it appears that the transit requirement will not be included; however, ADOT&PF should remain cognizant that transit information may be included and required as part of the Final Rule.

It is expected that no additional funds will be allocated to states to establish their RTSM programs. States will have to use their National Highway System, Congestion Mitigation and Air Quality Improvement, and Surface Transportation Program apportionments for any related activities.

For additional information on the interim guidance on the Information Sharing Specification and Data Exchange Formats for the RTSM Information Program visit the following website.

http://www.setonresourcecenter.com/register/2007/Oct/15/58347A.pdf

For additional information on the RTSM Information Program NPRM visit the following website.

http://edocket.access.gpo.gov/2009/pdf/E9-392.pdf

Section 1.4 of the Alaska Iways ITS Standards Technical Appendix also addresses the proposed requirements of the RSTM.

6.4 Other Considerations for Successful ITS Implementation

There are several issues the State needs to be mindful of before implementing ITS projects in order to foster an environment where ITS can successfully satisfy transportation goals and objectives. It is best that these considerations are addressed as early as possible in the project's life cycle so results can be

taken into consideration when weighing projects against each other for possible implementation and prioritization. These issues, if not addressed, may ultimately act as barriers to project implementation or may simply affect the success of the project once implemented. These issues include:

- Outreach
- Funding
- Staffing
- Implementation approach
- Continuity of operations, and
- Standards

Failure to consider and address these issues may also decrease the effectiveness of the statewide or regional planning process, lead to poor perception of public agencies and their investment, and result in ITS being viewed as an inefficient means of addressing transportation goals and objectives.

6.4.1 Outreach

Funding ITS projects, and for that matter incorporating ITS into traditional planning processes, is difficult to achieve without broad-based support and approval of ITS. To be effective in implementing ITS projects, agencies involved in the traditional planning process must be comfortable with ITS, understand what it does, and how it can be used to satisfy regional goals and objectives, perhaps more from the institutional than technological perspective. This means providing continuing education for those individuals and agencies that do not have a solid understanding of ITS. This includes not only individuals and agencies associated with a project, but also elected officials, agency staff, as well as the general public. The newly created ITS Alaska (the state chapter of ITS America) can provide a forum for reaching out to individuals, providing information pertaining to state and regional ITS activities and educating those unfamiliar with ITS concepts and terminology. Outreach helps to break-down barriers and misconceptions of ITS, making it easier for individuals to visualize how ITS can be used alongside traditional highway improvements to deliver benefits at significantly lower costs.

The State of Alaska and the ADOT&PF have already been active in this area, and have to a large extent achieved broad-based understanding and support for ITS. This support is demonstrated by the support and active participation of agencies in ITS activities in the region, the formation of the ITS Alaska, as well as their acceptance and compliance with Federal ITS requirements for implementing ITS projects.

To continue this course and to solidify support for ITS the ADOT&PF must not let up on these efforts and should continue to gather support though effective and targeted outreach.

Outreach provides a medium through which the reasons for, and benefits of ITS can be expressed. It is also a valuable tool for smoothing the implementation of strategies by promoting inter-agency cooperation, while at the same time mitigating any adverse reaction. ITS outreach activities include both delivering and gathering information from four key stakeholder groups:

- Intra-agency stakeholders,
- Inter-agency stakeholders,
- General public, and
- Key decision makers.

Outreach activities should be on-going, whether or not anything “new” is happening in the state. Additionally, project champions should tailor their outreach efforts to the specific groups to which information is being delivered. In doing so, the benefits of ITS activities will be more easily understood and consistently communicated, breeding an environment where ITS can flourish.

6.4.2 Funding

As with any type of project, the ADOT&PF and other statewide transportation agencies must secure the funds needed to support ITS projects. The funding needs of ITS differ significantly when compared with traditional highway improvement projects. With traditional highway projects, funding is needed to design, build and maintain hard highway infrastructure. Because budgets are becoming more and more limited, ITS projects will encounter more and more competition with other types of both traditional and non-traditional transportation projects. Because of this competition, individuals responsible for ITS project implementation must be flexible in using federal, state and local revenues. Although, this Implementation Plan phases potential ITS projects within a 10 year planning horizon, the timing of project implementation is of lesser importance than the general sequencing of project implementation. Therefore, project implementation should occur as funding becomes available, and follow the general phasing of project implementation. Depending on the type of ITS project being implemented, funding may be needed to support the following activities:

Planning and Design

As with most capital projects, ITS projects require planning and design work to determine what will be built, how it will be built, and what level of mitigation (if any) is required. Special attention needs to be given to ensuring that enough funds are allocated for planning and design. This is crucial for adequately defining the project, so that cost estimates are reasonably accurate to budget for the construction, operation, and maintenance phases.

Project Capital

Funding is also needed to purchase the physical hardware, software, and communications needed to build and support development of systems being implemented. Again, project champions need to verify that costs for equipment and materials are reflected in proposed project budgets, if applicable. Capital expenditures for ITS will include, but are not limited to:

- Infrastructure, including roadside devices, communications mediums (e.g., fiber-optic cable), and the infrastructure required for the ITOCC
- Software
- Other materials directly tied to project implementation (e.g., marketing, training materials, etc.). These are generally one-time charges.

Operations and Maintenance

Adequate operations and maintenance funding is needed for effective system operation. Because the level of sophisticated technical and software systems inherent in most ITS projects is substantial, operating agencies like ADOT&PF need to account for responsive and preventative maintenance to ensure a full design lifecycle for each system. New ITS projects will likely employ new functions and will involve additional maintenance activities that staff currently do not perform. Depending on the workloads of existing maintenance personnel, providing training may require that staff work overtime to fix problems, or new staff may need to be hired to assist with these problems. The operations and maintenance activities that have an effect on funding levels include:

- Increased complexity of maintenance activities.
- Lack of personnel experienced on how to maintain new systems.
- Difficulties that arise from system implementation.

One of the benefits of adopting ITS standards will be the development of more interoperable equipment and common system platforms. This will encourage more choices of vendor, which helps reduce replacement costs.

Staffing

Staff are needed to plan, build, manage, support, and maintain ITS projects. Contractors may be hired on a full-time or part-time basis to satisfy or supplement staffing needs. Outside contractors may be especially useful and effective for maintenance needs. Contractors in these situations can be hired only when conditions warrant thus saving the funds needed to employ a staff person on a full-time or part-time basis. With this said, however, the response when systems need to be fixed may be much slower then contractors, if used. Project champions need to carefully consider the advantages and disadvantages of these various staffing options and select the ones that best fit the needs and budget constraints of their respective agency.

Training

As ADOT&PF continues to deploy ITS, it will be increasingly important to ensure that the staff responsible for operating and maintaining these devices receive adequate training, and that training costs are included in proposed project budgets. Training will be required for all existing and new employees responsible for operating and maintaining ITS in Alaska. Providing proper and adequate training will help ensure that maximum benefits are derived and system life is maximized. Training should not only cover how to use new or modified systems, but also the reasoning behind why systems are being implemented or updated. Similarly, staff will need to know when they should begin using the ITS system and the recommended procedures for migrating their existing files to the new system (if the project is replacing an existing system). Project champions need to plan on how to train staff, who will be responsible for training them and assessing the potential cost implications training requirements have on overall project implementation.

6.4.3 Staffing

Staff education, availability, and retention are critical aspects of ITS projects and should be carefully considered before projects are implemented. Agencies sponsoring ITS projects need to identify individuals that will be responsible for operation and maintenance of that system. If, for some reason, this individual is unavailable, it is wise to have additional staff trained so seamless operations will not be affected.

Staff Skills and Knowledge

Staff responsible for implementing, operating, and maintaining ITS elements should be appropriately trained. Systems engineers should have knowledge of the system engineering process, ITS standards and their applicability, ITS procurement process, communications requirements, and needs for ITS deployments. Agencies may find it beneficial to develop staff skill matrices to quickly identify the skills or knowledge needed when staff leaves.

Staffing Levels

Before ITS projects are approved for implementation, the ADOT&PF or other implementing agency should verify that the project can be adequately supported given current agency staffing levels. Agency staff is needed to plan, deploy, operate, and maintain ITS projects. It is critical that an appropriate number of staff be available to ensure that subsystems are operated effectively, maintained, and replaced accordingly. If staff are not available to perform these functions, maintenance issues may be ignored and subsystems may be operated in an unsafe and/or inefficient manner. This may result in costly and otherwise unneeded replacements, inefficient use of expensive resources and a poor public perception of ITS investment. Sponsoring agencies should consider hiring outside contractors to supplement staffing needs, if necessary.

6.4.4 Continuity of Operations

Maintaining operational continuity is an absolute must for ITS projects. Failure to keep systems up and running will result in public distrust. For most new ITS applications, maintaining operational continuity will not be much of an issue, since this activity is simply a process of adding on additional functionality; however, consideration should be given to operating the system correctly. Besides new projects, there will be ITS projects proposed that will replace existing systems. In this regard, halting operations for a designated period of time, while the new subsystem is being installed, is not an option. Operating in this fashion opens the door to several problems, the biggest being a reduction in safety. Maintaining operational continuity before, during, and after systems are implemented is a challenge that system implementers must address to ensure that the public's perception of ITS is a good one.

6.4.5 Standards

Standards define how elements associated with an ITS project will interconnect and interact with other ITS elements. The underlying principal behind standards is that they enable subsystems to be designed using "open" platforms. In other words, standards allow subsystems to be easily upgraded or replaced when they fail, and are interoperable. Before the introduction of standards, subsystems were often developed using proprietary software, that could not be replaced with a similar subsystem or product other than those made by the same manufacturer.

ITS systems proposed for implementation should be developed in line with U.S.DOT approved standards. Standards must be identified prior to implementing projects funded by the National Highway Trust Fund. The FHWA rule and FTA Policy on Regional ITS Architectures states that, "… federally funded ITS projects use, where appropriate, U.S.DOT adopted ITS standards". To find more information on ITS-related standards, visit:

http://www.standards.its.dot.gov/

6.5 Overview of Alaska's Major On-going and Influential ITS Projects

The following section summarizes on-going ITS projects and supporting activities. These projects and activities are not intended to provide a complete understanding of ITS activity performed to date, but rather give emphasis to those projects that have major influence on project implementation in Alaska. In having this influence it is expected that these projects will be influential in guiding ITS development and will in themselves provide the foundation for additional ITS projects going forward.

6.5.1 CARS/511 Travel Information System

This project provides a web-based series of input screens, allowing staff in various operational units (e.g., maintenance, construction, AST, and AMHS operations) to enter relevant information that affects travelers. Its the centerpiece of a larger travel information system. As of February 21, 2008 30 states have operational 511 programs, with several others expected to become operational by the end of 2008. Events such as road closures, restrictions due to maintenance or construction, or even information on extraordinary vehicle movements such as oilfield modules can be shared. Weather road condition and construction reports will also be displayed. Eventually, information from the RWIS stations and the AMHS vessel tracking system is integrated into 511. To find information on Alaska's 511, visit: http://511.alaska.gov.

6.5.2 Automated Vehicle Identification (AVI) E-Screening

ADOT&PF, Measurement Standards and Commercial Vehicle Enforcement is installing Automated Vehicle Identification (AVI) E-screening sites along highways throughout the state. MSCVE installed the first of these systems at the Glenn Highway Inbound and Outbound Weigh Stations, just north of

Anchorage. This system, as will others deployed around the state, consists of overhead antennas and roadside cameras, coupled with in-vehicle transponders that automatically check the safety rating and credentials of participating motor carriers and vehicles. If checks come back ok, the system will allow vehicles to proceed down the highway without stopping.

This screening process will result in time and cost savings for safely-operating motor carriers and allow Commercial Vehicle Enforcement officers to focus time and resources on carriers and vehicles that need more attention.

6.5.3 Alaska Land Mobile Radio

The Alaska Land Mobile Radio (ALMR) system is a shared-cost communications system situated along major highways and in communities, and based on trunked radio transmissions between vehicles or base stations. ADOT&PF is working with the statewide ALMR effort to deploy subscriber units to support Maintenance and Operations forces. The ADOT&PF's LMRS will integrate with the ALMR project so that both data and voice move seamless among the various public safety agencies. Once complete, the ALMR will provide a communications backbone along highways and permits data or voice communications between a wide variety of governmental and private sector users. This communication backbone will be able to support the implementation of other ITS components (e.g., RWIS, roadside traffic components, and WIM and scour sensors). It will improve the roadway safety and efficiency of ADOT&PF operations and enhance the quality of life throughout the State.

6.5.4 Geographic Information Systems for Transportation

The Geographic Information Systems for Transportation (GIS-T) links historic and archival data with real-time information. It uses consistent geo-spatial reference to provide a platform capable of displaying all relevant geo-spatial data in a flexible, graphical format. The merged data will enhance planning and operational efficiency and decrease the cost of obtaining information using older paper map and tabular databases. By providing accurate information in a more useful format, GIS-T will help improve traveler safety, increase the efficiency of ADOT&PF operations, and enhance the quality of life in the State of Alaska.

6.5.5 Alaska's Road Weather Information System and the Alaska – Canada Highway Road Weather Portal Project

The Alaska Road Weather Information System (RWIS) network is a collection of environmental sensor stations (ESS) located along Alaska's major roadways. Each sensor station site has several weather and pavement sensors that collect data on pavement conditions, atmospheric conditions and sub-soil temperatures. Additionally, several sites are equipped with digital cameras that show weather and pavement conditions at the site. RWIS data are used to support ADOT&PF internal operations, especially maintenance, and public decision making. RWIS data is also shared with other agencies such as the national weather service and military bases, to support operations of these agencies to build a more robust collection of weather data.

As part of its RWIS project, the ADOT&PF is continually looking at ways to improve weather data collection and to assemble a more complete, accurate picture of weather events. The ADOT&PF, in partnership other statewide and Canadian agencies is helping to develop a web application that would provide both travelers and highway maintenance personnel with real-time, quality-checked weather observations for the ALCAN Highway and major connecting routes. The other agencies involved in the project include:

- Alberta Infrastructure and Transportation
- British Columbia Ministry of Transportation
- Yukon Department of Highways and Public Works
- Environment Canada
- National Weather Service Alaska Region

This project is serving as one of three regional demonstrations for Phase 1 of the Federal Highway Administration's (FHWA) *Clarus* Initiative. The *Clarus* System is being designed to collect atmospheric and pavement data from government transportation agencies, perform real-time quality checks, and disseminate the observations, quality check flags, and metadata to the transportation agency and any other organization that might need a complete set of road weather information across a large region. Information on the *Clarus* Initiative can be found at: http://www.clarusinitiative.org/

6.6 Overview of Alaska's Approved ITS and ITS Related Projects (Near-Term)

The Statewide Transportation Improvement Program and the Anchorage TIP provide a set of transportation projects slated for implementation over the next several years. Within this set of projects, is a subset of projects that either contain or entirely deploy ITS elements. For this reason, ITS-related projects in the STIP and Anchorage TIP are valid in determining the direction of ITS deployment in Alaska. These proposed and approved projects fill in gaps in ITS deployment and specifically address transportation related needs. For instance, projects identified in the ADOT&PF STIP were derived in part through the transportation related needs documented in the ADOT&PF Needs List, as well as through other outreach activities. Programmed projects essentially serve as the near-term deployment of ITS in that they are either currently being deployed or are slated to be deployed in the next 3 years. These projects while setting the direction for ITS deployment, serve as the foundation from which future ITS deployment will occur. With that said, proposed and approved projects must be considered in recommending future projects, so that ITS deployment can occur in an incremental, phased fashion that builds upon previous efforts.

6.6.1 Statewide Transportation Improvement Program (STIP) Projects

Projects listed in the Statewide Transportation Improvement Program funded through various sources available to the state most notably the Federal Highway Administration and Federal Transit Administration. The state receives several categories of funding from each of these agencies. Each category has distinctive rules for project eligibility, match ratios, and other programming factors. Projects included in the STIP are discussed below.

Alaska Highway Rehabilitation/WIM Installation

This project will re-level and resurface the Alaska Highway from MP 1267 to 1314, in the Southeast Fairbanks region. As part of the project a Weigh-in-Motion system will be installed on the highway.

Bridge Scour Monitoring and Retrofit Program

This project will install monitoring and telemetry and/or construct physical scour countermeasures at State bridges identified as scour critical by the federally mandated Scour Evaluation Program.

Approved STIP Funding allocation (2008-2009)

2008: $950,000

2009: $950,000

ARRC Collision Avoidance System

ARRC is nearing completion of a multi-phased program to design, develop, and implement a communication-based train control system that uses data radio communications between train dispatchers and train crews, or dispatchers and roadway workers. The Collision Avoidance System (CAS) project is comprised of a Computer Aided Dispatch (CAD) system, an on-board computer system, VHF packet data radio technology, and GPS locator technology. The CAS will provide improved information for decision-making, and will also detect infrastructure failure and potential operations violations quickly, and intervene when necessary. The CAS is accomplished in five phases, each achieving incremental safety benefits.

Computerized Materials and Maintenance Management System

This project will serve as a tool for the Reliability Excellence Program providing a flexible, cost-effective and automated system to support and manage equipment, facilities maintenance, purchasing and inventory.

Geographic Information Systems (GIS) Development

This project will upgrade ADOT&PF's transportation and GIS capabilities to develop a Highway Analysis System (HAS)-GIS interface. This interface will improve State road data distribution.

Approved STIP Funding allocation (2008-2009):

2008: $300,000

2009: $300,000

Weigh-in-Motion Equipment

This project provides funding to purchase and install weigh-in-motion equipment at sites on National Highway System, as well as maintenance and enhancements at these and existing sites. It is estimated that over the next 4 years an additional 4 WIM system sites will be built. Project funding will be used to install equipment at these sites. Additionally, funding will be used to address software and communications issues to allow viewing of near real-time WIM data via the web.

Approved STIP Funding allocation (2008-2009):

2008: $1,094,200

2009: $1,567,700

Highway Data Equipment Acquisition and Installation

This project provides additional funding to design, construct or rehabilitate traffic data collection sites and develop software for Alaska's federally required Traffic Monitoring System for Highways. ITS elements included in this project are; traffic data counters, cameras and computer hardware and software for remote data collection and analysis.

Approved STIP Funding allocation (2008-2009):

2008: $1,320,000

2009: $1,320,000

Wideband Multi-media Mobile Emergency Communications Pilot

This project provides roughly 4.6 million to increase the efficiency of public safety communication systems by adding a secure wideband data network. This pilot will establish a 4.9GHz mesh communications network that can only be accessed by emergency service providers in the Wasilla area.

This network will allow these users to transmit pictures, video, voice and text over a high-speed broadband connection similar to an internet site. This communication will allow dispatchers to communicate effectively with other agencies as well as personnel located in the field. The network will also serve to transmit video images to initiate an effective and timely response to incidents. Video will also be used during non-incident periods, for traveler information purposes, allowing travelers to make effective decisions and alter driving behavior when incidents do occur or when weather conditions are severe.

Approved STIP Funding allocation (2008-2009):

2008: $200,000

2009: $3,662,500

Glenn Highway MP 28-32 Anchorage/Matsu Corridor ITS Project

This project provides $900,000 for planning, design and construction additional dynamic message signs, low power FM or highway advisory radio, bridge automated de-icing systems, and environmental sensors for the Glenn Highway from milepost 28-32.

Approved STIP Funding allocation (2008-2009):

2008: $0

2009: $1,450,000

Seward Highway Anchorage to Girdwood ITS Project

This project provides over 1.4 million for planning, design, and construction for alternatives, which are believed to consist of ITS for providing advanced warning to driver of poor driving conditions, and for supporting additional traffic enforcement.

Approved STIP Funding allocation (2008-2009):

2008: $0

2009: $937,000

Intelligent Transportation Systems Implementation Plan

This project provides over 3.3 million to implement projects that were included in the original Alaska Iways Architecture. These projects align with the original 6 program areas:

- Snow and Ice Removal
- Multi-modal information connections
- Traveler Communications,
- Internal Operation,
- Commercial Vehicle Operations,
- Traveler Safety and Infrastructure Security.

Approved STIP Funding allocation (2008-2009):

2008: $1,675,000

2009: $400,000

Intelligent Transportation Systems Operations and Maintenance

This project provides over 2.4 million for operations and maintenance of ITS project that are part of the Alaska Iways Architecture Implementation Plan. Funding is for design, right of way, construction, and utilities.

Approved STIP Funding allocation (2008-2009):

2008: $360,000

2009: $360,000

Maintenance Management System

In 2002, the ADOT&PF began development of the Department's Maintenance Management System (MMS). The MMS project was initiated to comply with the Government Accounting Standards Board Statement Number 34 (GASB 34) reporting requirements, which require documentation of maintenance and preservation activities on Alaska's highways, airports, and ports and identification of the system's overall conditions and level of service. To date, the department has used roughly 2.1 million to establish the system which has been operational for several years. To date the system effectively manages ADOT&PF maintenance responsibilities and is able to track and plot assets within a GIS, which can be publicly viewed over the internet. This project provides additional funding to automated time sheet reporting, tracking of budget expenditures, work planning, deferred maintenance tracking, forecast budget requirements, and public service levels.

Approved STIP Funding allocation (2008-2009):

2008: $1,311,000

2009: $766,000

6.6.2 Anchorage Transportation Improvement Program (TIP) Projects

Projects listed in the Anchorage Transportation Improvement Program are funded primarily through US DOT funds. The TIP prioritizes and describes capital projects to be completed in the coming years, and indicates the amount of funding currently available or needed to implement projects. Projects requiring the use of federal funds are coordinated through the Anchorage Metropolitan Area Study Solutions (AMATS) group which is a cooperative effort between Municipality of Anchorage and the ADOT&PF. Projects included in the TIP are discussed below.

Traffic Control Signalization Program

This project provides 1.65 million in approved and estimated funding for a combination of updated traffic signal timing plans, a new traffic management center, and additional emergency vehicle and low priority transit signal pre-emption. The MOA Traffic Department Signal Division will be responsible for implementing and operating projects under this program.

Approved TIP funding allocation (2008-2011):

2008: $250,000

2009: $200,000

2010: $200,000

2011: $200,000

Beyond 2011: $300,000 (estimated)

ITS/ Automated Operating System

This AMATS project provides $600,000 to PeopleMover to implement/operate public transportation ITS projects. Projects include automated ticketing, smart fare boxes, web-based interfaces, and automated telephone system for the para-transit system.

Approved TIP funding allocation (2008-2011):

2008: $100,000

2009: $100,000

2010: $100,000

2011: $100,000

Beyond 2011: $0 (estimated)

Anchorage Integrated Roadnet, Phase2

In 2002, the Municipality of Anchorage began the Integrated Roadnet project in an overall effort to integrate the Municipalities existing road network information system (Roadnet) into an integrated geodatabase management system. The Roadnet project, which is a joint project between the MOA and ADOT&PF, will result in a multi-agency, single and comprehensive source of GIS information for the Municipality. The project supports the needs of several stakeholders that include:

- Planning
- Public Works
- Traffic Engineering
- Public Safety
- Transit

This list represents just a sub-set of agencies that will benefit from the Roadnet system. The system has the support from the ADOT&PF, and will be integrated with ADOT&PF geodatabases.

Funding for Phase 2 of this project will complete and refine the Roadnet system. When completed, the system will establish a common roads network and database for multiple State and Municipal agencies/ reducing data redundancy, staff time, and errors.

Approved TIP funding allocation (2008-2011):

2008: $0

2009: $50,000

2010: $50,000

2011: $0

Beyond 2011: $0 (estimated)

PeopleMover Fleet Improvement and Support Equipment

This project funds improvements to existing transit and para-transit fleets. Projects that might fall under this project include: a ticket reader and issue system, security systems, transit/signal improvements for headway enhancements, mobile display terminals, and vehicle communications and location systems.

Approved TIP funding allocation (2008-2011):

2008: $250,000

2009: $250,000

2010: $350,000

2011: $350,000

Beyond 2011: $0 (estimated)

Management Information Systems

This project funds information systems necessary for efficient management of the public transportation system. Typical projects include: Geographic Information Systems (GIS) capabilities, upgrades to the automated maintenance system, refueling and inventory system, a new computer aided dispatch system.

Approved TIP funding allocation (2008-2011):

2008: $50,000

2009: $50,000

2010: $50,000

2011: $50,000

Beyond 2011: $0 (estimated)

6.7 Potential ITS Projects (Mid- and Long-Term)

Potential projects are projects that can be conceptually deployed or integrated in Alaska in the 3-10 year timeframe. These projects, identified by a wide group of stakeholders, are applicable for addressing needs or work directly at further developing existing ITS elements so as to fill gaps in technology to make a more robust system. Potential ITS projects also offer the opportunity to grow the existing statewide ITS and short-term projects that are approved and programmed for funding.

Because ITS cannot be integrated all at once, both existing and new systems should be integrated over time. This section describes how potential ITS projects in Alaska can be integrated over time to maximize benefits of each system. For this reason, potential ITS projects are classified as being planned for deployment in the mid- (3-5 years) or long-term (5-10). Potential ITS projects that are not feasible within the next 10 years are also identified, but only for the sake of preserving knowledge for future plan updates. This functionality is also predicated on the assumption that adequate and reliable communications will be provided.

6.7.1 Mid-Term (3-5 Years)

Potential mid-term projects are envisioned for Alaska within the three to five year timeframe. Within the five-year horizon, ITS deployments will begin to migrate into an integrated system. This will be fostered by an increasing number of ITS deployments and by the development of enabling technologies that will provide the basis for multiple functions. The goal of this period is to continue to incrementally expand ITS deployment that currently exist today or is programmed for deployment in the near-term. For instance, it will be beneficial to expand coverage of the existing networks of cameras, environmental sensor stations, and dynamic message signs. These types of projects are relatively inexpensive, highly visible, and provide the infrastructure needed to enable future projects like an integrated traffic operations and communication center. In comparison to the long-term, mid-term projects as well as near-term projects focus on deploying ITS elements that show the greatest potential to produce benefits, or that enable the implementation of other systems, thus forming the foundation for future ITS applications to be developed in the long-term. The following projects are considered viable mid-term projects.

Expanded Deployment of Closed Circuit Television and Digital Cameras

CCTV cameras will continue to play a significant role in enhancing operations and improving safety and security in Alaska. Therefore, cameras should continue to be deployed at strategic points along highways and near critical infrastructure to maximize their effectiveness and overall benefit. Cameras may be deployed at the following locations as needs are identified and as funding is available to design, implement, operate and maintain them.

- New or unequipped RWIS sites to visually verify weather and pavement conditions.
- WIM sites and areas of known traffic congestion to monitor traffic, visually verify incidents, and enforce commercial vehicle activity.
- Locations of historical concern (e.g., high-accident locations, locations frequently affected by weather) to visually detect and verify incidents and to initiate a quick response to them.
- At hard infrastructure of critical importance (e.g., bridges and tunnels) to monitor general activity and preserve security.
- Near ITS infrastructure to remotely verify system status (on/off) and assess whether or not systems are operating correctly.

In addition to these locations, consideration should also be given to deploy cameras at signalized intersections along major arterials to assist in efforts to respond to traffic incidents, as well as to improve operations at these locations.

Public access to travel conditions (especially visual images seen on television and via the Internet) will help motorists make better travel plans. Additionally, camera images and video should continue to enhance public awareness and acceptance of the overall ITS program.

Expanded Deployment of Dynamic Message Signs

Additional dynamic message signs installed at strategic decision points or at locations immediately upstream of where problems are known to occur will improve safety and decision making. Dynamic message signs can be used to provide motorists with real-time information, and based on that information motorists can alter their driving behavior or make effective travel choices based on real-time information. Besides deploying additional new DMS, ADOT&PF should investigate possibility of relocating existing, permanent DMS to locations where information will provides enhanced benefit to motorists. There is the potential to integrate DMS with fog detection systems to provide real-time advance notification in areas with historical prevalence of fog. This may be especially applicable for the Glenn Highway near the Matsu. Additional DMS will also be used to provide Amber Alerts to the public, when such alerts are issued.

Expanded Deployment of Environmental Sensor Stations

Additional deployment of environmental sensor stations will lead to a more robust network of weather instrumentation, data from which can be used to better pin-point weather conditions and phenomenon, and lead to improve micro-scale weather forecasts. Additional ESS are needed to fill in gaps that currently are present between existing ESS. By filling in these gaps in coverage, a more complete picture of weather conditions can be observed leading to improve response in treating roadways, operational decision making. Any additional deployment of ESS along the Glenn and Seward highways near Anchorage will work toward developing a variable speed limit system – a potential project identified as a possibility outside the 10 year planning horizon of this plan.

CVISN Deployment

By deploying various components of the CVISN architecture, ADOT&PF's MSCVE Division will exchange motor carrier safety and credential administration data with AST and the DMV. Information

will be accessible via the Internet. This functionality will allow implementation and integration of the following systems:

- Commercial Vehicle Safety Information Exchange
- Commercial Vehicle Credential Administration
- Advanced CVO Security Plan
- Commercial Vehicle Electronic Screening

Incident Management Planning

An incident management plan should be developed in the mid-term if not earlier to provide specific guidelines and procedures to follow given a variety of different types of incidents. The incident management plan will lead to improved incident response and safety, by developing specific emergency scenarios and detailing the roles and responsibilities of emergency agencies during each scenario. This will lead to improved understanding and coordination among emergency agencies. The incident management plan should also detail a list of emergency resources such as specialized fire suppression equipment, incident command vehicles, heavy towing equipment for trucks, as well as DOT and emergency management resources.

Assess Feasibility for Public/Private Partnerships

The private sector, whether it be cable TV stations like the weather channel, or for profit organizations specializing in traffic and transportation information can provide large scale access to transportation users. Partnerships between public and private agencies can be valuable to each agency's operations. For instance, the ADOT&PF, may own right-of-way along highly traveled corridors like the Glenn and Seward highway, where private agencies can deploy cameras. Images from can could be used by private agencies to provide content either during local news programming or via a media outlet's website. The ADOT&PF may be able to enter into agreements where the ADPT&PF could provide private agencies access to state-own right-of way for deploying cameras, in exchange for video or images from the cameras. Partnerships like this a win-win for both the public and private agency, and could lead to significant operational improvements without significant investment.

6.7.2 Long Term (5-10 Years)

Snow and Ice Control Operations

Data collected from smart snowplows will augment the data collected from RWIS stations. In turn, RWIS station data will be processed and provided to the smart snowplows via MDTs. This information will consist of work assignments (i.e. where materials need to be applied, rates of application, and priority of work locations). The avalanche and landslide detection systems will also foster safety by detecting and alerting emergency management agency personnel of potentially hazardous conditions.

HazMat Tracking and Response

In the long-term, traveler safety and infrastructure security will be enhanced through better HAZMAT tracking and response. Technologies will be deployed to improve response to HAZMAT accidents when they occur, mitigating the potential devastating impacts these accidents may produce. Technologies will also be deployed to monitor Commercial Vehicles carrying HAZMAT goods, in an effort to reduce the chance of an accident or terrorist act from occurring.

Speed Detection and Reporting

There is considerable interest in detecting and disseminating traffic vehicles speeds in the Anchorage area. The primary interest for speed detection is to provide en-route travelers with real-times vehicles speeds so as to allow these travelers to change their travel plans when congestion is present up stream of

their location. However, detecting vehicles speeds in real-time also enable automatic detection of incidents by detecting significant variations in highway speeds.

Transportation Data Archive

A single, common database shared among the various statewide transportation agencies will improve multi-agency operations, by reducing the level of effort currently expended to collect similar types of data. This archived will improve transportation planning, by providing additional types of data to participating agencies and enabling these agencies to make improved decisions based on this data. At a minimum, regional agencies need to consider the types of information that will be archived, procedures for archiving data, and the formats that data will be saved prior to establishing the archive.

6.7.3 Beyond 10 years

This section describes the level of integration envisioned for ITS deployments in Alaska within the next ten years. Within the ten-year horizon, ITS deployments will reach optimal levels of robustness, in terms of both functionality and integration.

Integrated Transportation Operations and Communications Center

The Integrated Transportation Operations and Communications Center (ITOCC) will serve as the focal point for statewide transportation control systems and information dissemination. The information collected and processed at the ITOCC will be used to assist with various functions and operations of the Alaska transportation system. This will enhance both internal and external integration. The ITOCC will likely start as a virtual center that networks existing operations centers. A subsequent project phase may develop a physical, staffed center where coordination and control of these systems can take place. The ITOCC will in part act as a statewide data archive and it will support the collection/dissemination of real-time data to improve transportation operations, traveler safety, and infrastructure security.

As the point for statewide transportation control systems and information dissemination, it is critical that ITOCC remain operational so Alaska's transportation system can be operated effectively. Therefore, a disaster response plan will be prepared dictating how Alaska's transportation network will be operated when the security of the ITOCC is compromised. Procedures outlined in this Plan may include operation of ITOCC systems from a secure remote facility or through an existing Regional Transportation Management Center.

Variable Speed Limit System

Due to Alaska's dynamic climate and rough topography, a variable speed limit system will improve highway safety by reducing vehicle speeds before or during adverse conditions. A variable speed limit system for Alaska will require a robust network of environmental sensors, traffic detectors, and dynamic message signs. For this reason, a variable speed limit system may not be practical until the network of environmental sensors and traffic detectors have first been installed.

Lane Control Systems

The Anchorage 2025 Long Range Transportation Plan recommends HOV lanes as one of many possible solutions to meet mobility needs of the Glenn Highway Corridor. This project is identified as a long-term project (2016-2025). The year 2016 would fall just within the 10 year timeframe of this plan. With that said, it is likely that lane control systems will not be implemented within the 10 year limit of this plan, but is worth mentioning as lane control systems will likely be needed and planned for the construction of HOV lanes.

6.8 Project Selection

ITS projects included in the STIP must compete with and are mainstreamed with other "traditional" transportation improvements. In general ITS projects and other traditional projects are recommended and scored by appropriate personnel in the ADOT&PF regional offices. Once all possible projects are identified regional personnel score these projects, arriving at a prioritized list of projects. The projects with the highest scores are then forwarded to the ADOT&PF Project Evaluation Board (PEB), whose members then review with other additional projects provided by personnel in other regional offices. Members of the PEB then score each project. The resulting scores are weighted, and then averaged to arrive at a new prioritized list of projects. The PEB does not score projects in the NHS or AHS. They also do not score projects within the state's two urban MPOs: AMATS – Anchorage, and FMATS – Fairbanks, as each MPO has a local policy board that oversees project selection for its area.

PEB members use a 2 step evaluation methodology to score ITS projects. This evaluation methodology is separated into two phases:

- Scoring in relation to prescreening criteria
- Scoring in relation to evaluation criteria

Each step is discussed in greater detail below.

Prescreening Criteria for ITS Projects

The prescreening process applies three criteria to proposed projects. Based on whether they meet each criterion, projects are considered for further evaluation and implementation. Projects must meet each criterion in order to be fully evaluated. In other words projects can only be fully evaluated if the answer to each and every question is "Yes". The prescreening criteria are as follows:

- Are the project implementation and operation plans clearly defined?
- Does the project fully conform to the Alaska Statewide IWAYS Architecture and the National ITS Architecture?
- Does the project documentation clearly identify all NTCIP requirements, and is it designed to meet these requirements?

If the answer to each of the questions above is "yes", then projects can be fully evaluated using the evaluation criteria and project scoring methodology discussed in the next section.

Evaluation Criteria and Project Scoring

The project scoring process consists of 11 evaluation criteria with differing weighted values ranging from 10 (highest/most important) to 2 (lowest/ least important). The maximum possible weighted score for each project is 235. An un-weighted value between 5 and -5 is assigned to a project for each criterion, depending on its characteristics. This value is multiplied by the weighted value, to obtain its weighted score. After all weighted scores are calculated, they are added together to obtain the project's total score. After evaluating each project, the projects' total scores are ranked in ascending order, to determine the priority of project selection and implementation. However, please note that approved projects must be incorporated within the STIP or TIP depending on whether the project is classified at a statewide or regional project. Approved projects not listed in the STIP or TIP must be delayed until they are included in an update to the existing STIP/TIP. This allows for budget approval and spending by FHWA.

Brief descriptions of the criteria and the weight assigned to each are provided in Table 6-1. Again, the complete description of criteria can be found at:

http://www.dot.state.ak.us/stwdplng/cip_stip/stip06_09.shtml

A sample evaluation worksheet is provided in Appendix B. Each identified potential project is scored in Section 4.

Table 6-1: Evaluation Criteria for ITS Projects

Criterion	Description	Weight
1	Fosters the department's ITS Program Areas defined in the Alaska Iways Architecture Implementation (AKIA). Scores range from 0 to 5.	10
2	Enhances the department's operating budget. Scores range from -3 to 5.	5
3	Integration within the department ITS Plan. Scores range from 0 to 5	3
4	Integration external to the department, including other agencies and/or private sector. Scores range from 0 to 5.	3
5	Local, other agency or user contribution to funding project development. Scores range from 0 to 5.	3
6	Local, other agency or user contribution to fund maintenance and operation costs. (For non-DOT or DOT unsuited to long-term ownership). Scores range from 0 to 5.	3
7	Magnitude of project costs including capital and operating. (Include allied projects in cost calculation.). Scores range from –5 to 5.	5
8	Sustainability of technology involved. Scores range from 0 to 5.	5
9	Multi-use potential. Scores range from 0 to 5.	5
10	Time to Completion. Scores range from 0 to 5.	3
11	Geographic benefit. Scores range from 0 to 5.	2
	Highest Possible Weighted Score	235

Project Evaluation and Analysis

Table 6-1provides an overview of the criteria used to evaluate potential ITS projects in Alaska, as noted earlier in this section. Table 6-2 provides a sample project evaluation table. For each round of project evaluations, the PEB will prepare this type of table, which lists proposed projects by the type of system it implements. Each member of the PEB will then score each project according to the criteria presented in Table 6-1. The results will be presented in the far right column in Table 6-2. The total possible weighted score for each project is 235.

Table 6-2: Example Project Evaluation Table

System	Component	Score
Traveler Information System	Example Project TI-1	
	Example Project TI-2	
	Example Project TI-3	
Transportation Management System	Example Project TM-1	
	Example Project TM-2	
	Example Project TM-3	
Maintenance Management System	Example Project MM-1	
	Example Project MM-2	
	Example Project MM-3	
Commercial Vehicle Operations	Example Project CVO-1	
	Example Project CVO-2	
	Example Project CVO-3	

6.9 Characteristics of Integration

ITS integration can be viewed from two distinct and interrelated perspectives: institutional and technological. To fully realize the benefits of integration, both perspectives must be considered. Institutional and technical integration require a high-level conceptual view of the future system, institutional cooperation, and careful, comprehensive planning. This section describes the characteristics of both perspectives.

6.9.1 Institutional Cooperation and Integration

To achieve institutional integration, various transportation service providers must coordinate and cooperate with each other. Characteristics of successful institutional coordination and cooperation include:

- Champions identified by each involved agency or service provider
- Partnerships formed between both public and private sector entities
- Applicable policies that are agreed upon, adopted, and put in place to support ITS deployment, operations and maintenance across multiple jurisdictions
- Signed written agreements that are developed internally, involve affected stakeholders, and focus on providing adequate funding for the operations and management of systems that have a regional impact
- Adequate staffing that has been agreed upon and secured to support ITS implementation, operations, and maintenance
- Adequate office and equipment space to physically locate equipment (workstations, servers, maintenance materials and supplies, etc.), and to house staff so that operations between agencies can be uninterrupted and as seamless as possible.
- Regional public and private stakeholders that have implemented operational and data exchange agreements

The goal is to achieve the seamless operations and interoperability of regional ITS. Transportation service providers can work toward this goal by coming to an agreement on the following issues:

- Benefits to be derived from the various systems to be implemented
- Responsibilities for operation and maintenance of systems, including delineation of which activities will be independently performed and those that will be shared.
- Functionality to be realized with system deployment
- Technologies and applicable standards to be implemented
- Operating procedures
- Opportunities for future system enhancements

The process of coming to an agreement on these issues can be a significant undertaking for all parties involved in developing, deploying, and operating ITS elements in Alaska. It will require significant coordination and cooperation between traditional transportation service providers (e.g., ADOT&PF) and others that play an integral part in transportation safety and efficiency (e.g., AST and emergency medical services). Similarly support and cooperation is needed among individuals and departments within the ADOT&PF and other transportation agencies. Existing policies and procedures that affect ITS integration must also be considered during this process.

In many cases, specific agreements for ITS will not be needed because projects will only involve the departments within the ADOT&PF. However, this is not to say that these departments do not need to communicate and cooperate with each other. In some cases, inter-departmental agreements may be needed. Because ADOT&PF departments are often focused on different activities and therefore different

operational objectives, it is important that department roles and responsibilities are well understood before projects proceed. Also, ADOT&PF as well as other agencies implementing ITS should communicate needs to other outside agencies before proceeding too far with projects so as to develop partnerships with these agencies. In doing so, projects can produce results that benefit multiple agencies, and in doing so establish working relationships that can be carried forward to other future projects. To date ADOT&PF has been very active in working with other outside agencies when implementing ITS projects. For instance, there are agreements with the MOA and the Alaska State Troopers (e.g., CARS, GIS, Cooperative Agreement required to develop the MOA's Regional ITS Architecture.) Also, ADOT&PF have worked with, and established MOUs with Elmendorf Airforce Base, the National Weather Service, University of Alaska – Fairbanks, and the Federal Aviation Administration when implementing RWIS across the state. These agreements have allowed for these agencies to either collocate equipment at RWIS sites or use data weather data.

There may also be a need for inter-departmental agreements within ADOT&PF. These agreements could include:

- Transit Signal Priority Design and Operations
- Regional Traffic Operations Center (Operations)
- Closed Circuit Television Cameras
- 511 content and expansion

6.9.2 Technical Integration

Technical integration is the process of developing, implementing, operating, and maintaining the systems that enable various users and other systems to collect, process, store, access, and use electronic information. Technical integration can also include integrating existing systems with other existing and planned systems. Achieving technical integration is complicated when various components are owned and operated by multiple agencies. It is further complicated when these systems are not designed to be "open," thereby making integration more difficult. Institutional structures and agreements that support systems integration must be in place in order to achieve technical integration.

Alaska's migration towards an integrated system of systems and services will occur over time. Integration in Alaska will result from an evolutionary process that considers both technical and institutional issues. Discussed below are issues affecting integration of ITS in Alaska.

6.9.3 Applicable Standards

ITS standards are industry-consensus communication standards that define how system components exchange data with one another. Because the use of standards is so crucial to the successful implementation of ITS, TEA-21 requires that projects must conform to adopted ITS standards. By specifying how systems and components interconnect, these standards foster the integration and interoperability of multiple systems. To expedite the deployment of systems that are integrated and interoperable, the USDOT supports specific ITS standards initiatives, especially in areas that have significant public benefit. The USDOT ITS Standards Program is working toward the widespread use of standards to encourage ITS interoperability.

ADOT&PF has a long history of implementing ITS, and because of this many of the department's systems where developed before these systems where considered "ITS". Also, because of the long history implementing systems, many systems were implemented before ITS standards were developed. (RWIS installed in 2001 were required to meet applicable ITS standards.) ADOT&PF is now implementing ITS standards to ensure interoperability between their systems and conformance with the USDOT ITS Standards Program. It will be important for ADOT&PF to continue to use applicable standards as they are developed, and when new systems are installed to replace existing ones. However, ADOT&PF should not replace existing systems before their useful functional life is completed simply to conform to standards.

Rather, they should install standard-compliant systems over time, as replacement of existing equipment becomes necessary.

6.9.4 Standardizing Field Equipment

ADOT&PF should strive, where possible, to deploy standardized field equipment in addition to deploying systems that use applicable ITS standards. Although the amount of ITS field equipment currently in operation in Alaska is relatively limited, it would not be economical or feasible for ADOT&PF to replace existing devices with standardized equipment prior to the time it requires replacement. Instead, with minor upgrades and enhancements the existing, non-standardized equipment may continue to function for several years.

Training requirements can be reduced by deploying standardized field equipment, because it limits the number of devices for which operations and maintenance staff must be trained. Additionally, the deployment of standardized equipment can reduce maintenance costs because it limits the number of spare parts that need to be kept in stock. Purchasing large quantities of the same type of equipment can also reduce the cost of ITS technologies. With these benefits in mind, the project team recommends that ADOT&PF develop and adopt policies that promote equipment standardization.

6.9.5 Standardizing Computing Platforms

To fully integrate ITS it is crucial that ADOT&PF continue to require a common computing platform, open databases, and an operating system that enable systems to work together and exchange data. However, as with field devices, ADOT&PF should replace computing platforms and operating systems only as they reach the end of their useful lives. The agency has been pursuing this strategy for nearly a decade, and has identified common operating systems, database standards and other IT standards that follow industry norms.

6.9.6 Standards for Specific Program Areas and Projects

The Standards Technical Appendix to this document identifies applicable standards that support Regional and National Interoperability for each project identified in this Implementation Plan. These standards should be considered in the development and implementation of each project. Additionally, the State of Alaska's Enterprise Technology Services Department has standards currently in place for IT equipment, which should be reviewed before implementing ITS projects. Although IT standards are not the same as ITS standards, ITS projects may involve IT-related equipment that are subject to conforming with Alaska's IT standards. The State of Alaska's Enterprise Technology Services Department has approved standards for the following types of IT equipment that are often included in ITS projects.

- Asset Management Software
- GIS Software
- Computer hardware and software
- Servers
- Cameras

This is just a representative list, and standards may exist for other types of equipment. Additional information on approved IT standards can be found at:

http://www.state.ak.us/local/akpages/ADMIN/info/plan/

6.10 Policies Fostering Integration

To foster ITS integration in Alaska, it will be important to explore existing policies that relate to procuring, implementing, and operating ITS. Policies that can potentially foster the integration and interoperability of ITS are discussed below.

6.10.1 Integrating ITS with Regional Plans

The ITS Architecture and Standards Conformity Rule contains a provision that requires ITS-related decision making to be mainstreamed into the transportation planning process. This Code of Federal Regulations rule requires that ITS technology investments be included in transportation plans, programs, and projects. The rationale for this requirement is to ensure that key ITS projects and initiatives are targeted early in the planning process, which in turn facilitates more effective integration.

It is important that ADOT&PF develop and adopt policies ensuring that ITS initiatives are included in and conform to traditional transportation planning activities. ADOT&PF has already taken steps in this direction by partnering with the Municipality of Anchorage in developing the Anchorage Regional ITS Architecture. ADOT&PF's policies also need to include provisions that require other architecture documentation (e.g., the conceptual design) to be updated in conjunction with the transportation plan.

6.10.2 Operational Responsibilities and Interagency Agreements

Interagency agreements provide a mechanism for ADOT&PF to agree upon and document goals, objectives, and data-sharing procedures. It is important that these agreements include responsibilities and procedures that span geographic and jurisdictional boundaries. It is also important to recognize that interagency agreements may lack effectiveness unless operations staff understands them. These agreements can be formal memoranda of understanding (or agreements), or less formal letter agreements depending on the specific issues to be covered, local conditions, and relationships among the agencies covered by the agreement. The issues that ADOT&PF needs to consider in developing interagency agreements are described below.

Definition of Control and Operational Responsibilities

Interagency agreements should define whether ADOT&PF or another stakeholder is responsible for operating and maintaining systems that are shared between agencies or affect the operation of multiple agencies. Agreements should address who is responsible for operating the various systems under both normal and emergency operations. This should include the thresholds that necessitate the transfer of operations. For example, it will be crucial to define who will have control responsibilities of traveler information systems in the event of a major incident, severe weather, or natural disaster. Additionally, agreements should specify which agency is responsible for maintaining elements, so that they operate correctly and are operational when conditions warrant their use. An operations and maintenance plan may be useful to document operations and maintenance procedures and well as the agency responsible for performing these procedures. Interagency agreements can provide the initial foundation for operations and maintenance responsibilities, and in the future these agreements can be updated as more detailed discussions occur and additional responsibilities are identified.

Developing Data Sharing Agreements

A primary benefit associated with deploying ITS and supporting communications is the ability to exchange real-time and archived data between various operating agencies and service providers. However, agencies sharing information must agree upon several issues, including:

- Data security: This can be a significant issue when law enforcement agencies share data with other operating agencies, or when information contains personal information such as license plate numbers.
- The type of data that will be shared and how it will be used.
- Data formats and structure: For example, geo-spatial coded data must be consistent or it will not display properly in a computer mapping system.

Agency-to-Agency agreements are needed for the following projects:

- Geographic Information Systems for Transportation
- 511
- Traffic Signal Control System
- Integrated Transportation Operations and Communication Center
- Closed Circuit Television Cameras (if operated by multiple agencies)
- Highway Advisory Radio (if operated by multiple agencies)
- Dynamic Message Signs (if operated by multiple agencies)
- Road Weather Information Systems

6.10.3 Definition of Private Sector Roles

Private sector organizations have become an integral part of providing ITS services in many states, including Alaska. The traditional role for private companies in departments of transportation focus on pay for services activities, including:

- Providing design and support consultant services
- Providing products needed for the agency to conduct its business
- Implementing projects, most typically through construction contracts
- Providing operations and / or maintenance services.

ADOT&PF has made use of all of these roles. ADOT&PF as contracted for planning and design services, including the work done for the statewide ITS architecture and RWIS. Essentially all products from office computers to field devices are purchased through the private sector. Construction and most implementation projects are contracted to private companies, either through traditional low-bid procurements or best value selections through a request for proposal process, as was done for the statewide RWIS program. Finally, ADOT&PF has procured on-going operations and maintenance services, such as the maintenance contract for RWIS and for CARS. These types of roles for the private sector are termed outsourcing and will continue to be important for ADOT&PF and may gain in importance as new skills are needed (at least until such time as ADOT&PF can hire or train staff for these skills), to cover peak workloads (or staffing above that which is allowed), and to cover short-term needs. A few examples of outsourcing that ADOT&PF may use in the future include:

- Staffing a TMC (to augment staff or provide all operators)
- Staffing service patrols (this is a service that is often contracted out in its entirety)
- System operation and maintenance (such as the current situation with RWIS or CARS)
- Software support and service

When hiring/selecting a private company it is critical that ADOT&PF research appropriate procurement methods and select the method that places ADOT&PF in the best position to obtain the services it requires at a reasonable price. The procurement method is also critical in gaining interest from a broad set of private companies from which to make a selection. The broader the interest from the private sector, the more competition there will be and the DOT will be morel likely to contract for the skills and services needed at a reasonable price.

Traveler Information Business Plan

Discussions over the last decade or two have expanded the potential role of private sector companies to include providing their own investment, especially in ITS, to partner with public agencies or to provide services independently. In order for private companies to make these investments, there has to be potential revenue opportunities that will offset their investment and provide the potential for profit. The most common realm of public-private partnership in ITS has been in providing traveler information. The market in Alaska is not huge, but there will likely be some opportunities that will arise for a public-private partnership for traveler information. It will be important for ADOT&PF to consider their goals before entering into such a partnership. If public access to information and wide distribution of information are paramount, then the types of partnerships would be very different than if the primary goal was to try to have a revenue stream. (Please note that revenue streams back to public agencies to date are extremely small or non-existent in traveler information systems to date.) The primary revenue streams for the private companies in traveler information are to package information at act as a broker to other companies that need it, advertising (primarily on websites), and sponsorships.

To continue enhancing the services provided to travelers in Alaska, it will be increasingly important for ADOT&PF to foster public/private partnerships. ADOT&PF will be an important source of traveler information, and the private sector has the potential to play an integral role in providing the services to deliver the information to the public.

To provide the best possible service, a variety of private sector companies and other government agencies will need to participate. A Traveler Information Business Plan will enhance the successful integration of these multiple participants. In developing the Traveler Information Business Plan, it will be important to focus on ADOT&PF's and the private sector's respective roles in providing traveler information.

6.11 Updating the Statewide IWAYS Architecture

Alaska's Statewide ITS Architecture will need to be updated periodically, because transportation challenges and user needs/ desires will change. As with current ITS deployments, future initiatives must focus on prevailing needs and desires. As ITS is deployed over time, new opportunities for integration and functionality will be created.

Updating the ITS Architecture also provides an opportunity to ensure that emerging technological solutions are considered when identifying strategies to enhance travel safety and efficiency in Alaska. This will help ensure that transportation systems in Alaska continue to adequately meet travelers' needs. Based on these issues, ADOT&PF should consider developing and adopting policies that require the architecture and associated documentation to be updated when needed.

Before a new ITS project is funded, officials need to determine whether or not the project fits into the IWAYS Architecture. If all aspects of the project are completely covered then no action is needed and the project can be implemented. However, if some or all aspects are not accounted for in the Architecture, then a determination should be made of whether or not the project actually satisfies a transportation need for the region. If so, then the ADOT&PF will need to update the Statewide IWAYS Architecture to include the new project.

The procedure for updating the Architecture is provided in a separate memorandum to the Municipality of Anchorage and ADOT&PF.

The Alaska Iways Architecture was initially created in December 2003, and was last updated in 2008.

6.12 Funding Opportunities

As is the case with any project, mechanisms are needed to fund ITS projects. Funding is needed to support the ITS project throughout its entire life cycle. Specifically, funding is needed to design, implement, operate, and maintain ITS subsystems. Without adequate funding, it will be difficult to complete ITS projects on time, and to the desired functionality.

There are several types of funding opportunities available to implement ITS projects. These are discussed in greater detail later in this section. Project champions should understand the characteristics of these opportunities and be able to select those that best apply to potential ITS projects. In addition, project champions need to investigate how coordination among other agencies and departments can be drawn upon to help distribute funding responsibilities. This may include identifying how resources such as staff, equipment, and actual funding can be shared across different programs in an effort to reduce costs and maximize benefits when planning and implementing an ITS project.

The various funding opportunities available to fund ITS projects in Alaska are detailed below.

Federal Funding Mechanisms

Transportation funding at the federal level, unlike most other federal programs, is authorized as a massive nation-wide package every six years. The current package, which was signed into law in 2005, is the Safe, Accountable, Flexible, and Efficient Transportation Equity Act (SAFETEA). SAFETEA authorizes $244.1 Billion in funds for deploying multi-modal transportation projects, including ITS over a six-year period. This national package includes the following funding programs, which may be tapped to support ITS deployment:

- National Highway System (NHS)
- Surface Transportation Program (STP)
- Congestion Mitigation and Air Quality (CMAQ)

Each of these funding programs are discussed briefly below. Additional information on each of these funding programs is also available in the Alaska STIP located at the following website:

http://www.dot.state.ak.us/stwdplng/cip_stip/index.shtml

National Highway System

National Highway System (NHS) funds can be used for improvements to rural and urban roads that are part of the NHS, including the Interstate System and designated connections to major inter-modal terminals. Also included are highways that provide motor vehicle access between the NHS and major inter-modal transportation facilities, the defense strategic highway network, and strategic highway network connectors. These funds may also be used to fund transit improvements in NHS corridors, but certain restrictions apply.

In 2008 and 2009, Alaska's apportionment of NHS funds is over 61.4 and 54.0 million respectively. These amounts represent available funding (i.e., not programmed funds).

Surface Transportation Program

The Surface Transportation Program (STP) is a flexible funding program that state and local governments can use on any Federal aid Highway (including NHS). This includes any capital transit or bridge project. STP funds are allocated to the states, and must be distributed according to program specifications. Distribution requirements are outlined at:

http://www.fhwa.dot.gov/safetealu/factsheets/stp.htm

"Infrastructure-based intelligent system capital improvements" are eligible for STP funding. STP funds can be used for capital and operating costs for traffic monitoring, management, and control facilities. However, as with NHS funding, they cannot be used for routine maintenance. In 2008 and 2009, Alaska's apportionment of STP funds is over 96.8 and 88.6 million respectively. Again, these amounts represent available funding and not programmed funds.

Construction Mitigation and Air Quality (CMAQ)

"The Congestion Mitigation and Air Quality Improvement Program (CMAQ) provides funding for projects and programs in air quality non-attainment and maintenance areas for ozone, carbon monoxide (CO), and particulate matter (PM-10, PM-2.5) which reduce transportation related emissions. [23 USC 149(a)]". States are eligible for CMAQ funds so long as the ITS project reduces emissions. The state of Alaska's share of CMAQ funds is over $5.3 million and 4.5 million in 2008 and 2009 respectively. These amounts do not include $750,000 in rollover CMAQ funding available from previous years.

General information on CMAQ funding can be found at:

http://www.fhwa.dot.gov/safetealu/factsheets/cmaq.htm

Programmed and available funding information for each of the funding classes described above (NHS, STP and CMAQ) is available for the State of Alaska in the state's 2006-2009 STIP located at:

http://www.dot.state.ak.us/stwdplng/cip_stip/assets/06_09stip/06_09amendments/00_Amdt_17_FINALDRAFTCorrected2.pdf

In addition to the funds authorized specifically for ITS, ITS activities are eligible for funding from other programs. Both NHS and STP funds may be used for infrastructure-based ITS capital improvements, and CMAQ funding may be used for implementing ITS strategies to improve traffic flow, which contributes to air quality improvement. Transit-related ITS projects are considered capital projects and are therefore eligible for funding under specific transit capital programs (e.g., the Urbanized Area formula grant program and the formula grant program for non-urbanized areas). This is in addition to the STP, NHS and CMAQ programs.

Bridge Program

"Bridge Program funds may be expended for replacement, rehabilitation, painting, performing systematic preventive maintenance or seismic retrofit of, or applying anti-icing or de-icing compositions to, eligible highway bridge projects."

Coordination Border Infrastructure Program

Coordination Border Infrastructure Program funds are allocated to Border States like Alaska and may be used to improve the safe movement of motor vehicles at or across the border between the U.S. and Canada and the U.S. and Mexico. States may use program funds for:

- Improvements in a border region to existing transportation and supporting infrastructure that facilitate cross-border motor vehicle and cargo movements;
- Construction of highways and related safety and safety enforcement facilities in a border region that facilitate motor vehicle and cargo movements related to international trade;
- Operational improvements in a border region including improvements relating to electronic data interchange and use of telecommunication, to expedite cross border motor vehicle and cargo movement;
- Modification to regulatory procedures to expedite safe and efficient cross border motor vehicle and cargo movements; and
- International coordination of transportation planning, programming, and border operation with Canada and Mexico relating to expediting cross border motor vehicle and cargo movements.

Intelligent Transportation Systems Operational Testing to Mitigate Congestion (OTMC) Grant – The OTMC program provides funding for ITS projects that "make innovative uses of technology to address congestion on a specific facility or facilities, such as a corridor, an urban area or region. Accordingly, qualifying projects must be expected to directly result in significant, broad, and near-term congestion relief." Types of projects that apply include:

- Demand management pricing strategies
- Advance traffic signal control
- Innovative detection and management strategies
- Integrated corridor management
- Parking management strategies tied to transit service
- Highway occupancy/toll (HOT) lanes
- Managed lanes
- Ramp control
- Lane keeping devices
- Signal priority systems
- Contactless fare collection
- Real-time travel information
- Advanced traveler information systems
- Parking alerts or automatic vehicle locator systems

Project applications should demonstrate that proposed strategies will be implemented in a relatively short time frame (e.g., within 12 to 18 months from the date of procurement).

The U.S. DOT will provide up to the statutorily allowable 80 percent share of the estimated costs of an approved project. Funds available for the ITS-OTMC Program are intended to support the implementation costs of the proposed operational testing. Costs of planning, testing, managing, operating, demonstrating, monitoring, evaluating, and reporting are eligible for reimbursement. The Department will evaluate the allowability of proposed costs in accordance with OMB Circular A-87 Cost Principles for State and Local Governments.

Additional information about this grant opportunity can be found at:

http://www.grants.gov/search/search.do?oppId=11970&mode=VIEW

The full announcement can be found at:

http://apply.grants.gov/opportunities/instructions/oppDTFH61-07-RA-00111-cfda20.200-instructions.pdf

Bus and Bus Facilities Discretionary Program Grants—this Federal Transit Administration (FTA) funding program is open to State and local agencies and is intended to finance "capital projects to replace, rehabilitate, and purchase buses and related equipment (including intelligent transportation systems) and

to construct bus-related facilities…." Grants under this program are subject to a 20% local match. Special consideration will be given to the following priority areas:

- Fleet replacement needs that cannot be met with formula funds,
- Fleet expansion that allows significant service increase and/or improvements and/or operating efficiencies,
- Facility construction or renovation to support increased service or introduction of clean fuels,
- Strategic investments in rural areas where formula funding is inadequate,
- Purchase of clean fuel vehicles,
- Intermodal terminal project that include intercity bus providers, and
- Gulf Coast Recovery – capital to support bus and bus facilities replacement and expansion related to the impacts of the 2005 hurricanes (special eligibilities requirements apply).

Proposals may be submitted electronically through the following Web site:

www.grants.gov

The full notice of this program can be obtained at:

http://a257.g.akamaitech.net/7/257/2422/01jan20071800/edocket.access.gpo.gov/2007/E7-4832.htm

Value Pricing Pilot Program (VPPP)—this FHWA funding program is open to state or local governments, or public authorities (e.g., tolling agencies) and is intended to finance local value pricing pilot programs to reduce congestion, improve system performance, and promote mobility. Funds provided by this program are not intended for commonly used and accepted value pricing concepts [e.g., high-occupancy vehicle (HOV) to high-occupancy toll (HOT) lane conversions]. Projects that are eligible for funding under this program include, but are not limited to:

- Cordon tolls,
- Fair lanes,
- Priced new lanes,
- Pricing on toll facilities,
- Usage-based vehicle charges,
- "Cash-out" strategies/parking pricing,
- Regional pricing initiatives, and
- Truck-only toll facilities

The emphasis of project selection will be based on the ability to demonstrate near-term congestion relief and general alignment with the objectives outlined in the U.S.DOT's national strategy to reduce congestion on America's transportation network.

The current VPPP makes available $12 million for applicable projects on a yearly basis through 2009. One forth of this annual distribution will be set aside for value pricing projects that do not include tolls.

Grants submitted under this program are subject to a 20% local match. Other projects costs applicable for funding under this program and details on how to submit an application can be found in the full notice at:

http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2006_register&docid=fr22de06-132

Additional information on this grant program can be obtained at:

http://ops.fhwa.dot.gov/tolling_pricing/value_pricing/index.htm

ITS Earmarks

ITS earmarks may continue to be another source for ITS project funding. Although its predictability is somewhat limited and the amount or even continuation of ITS earmarks is in question, this funding source can provide supplemental resources for various ITS projects.

State Funding

The State of Alaska may use collected taxes from gasoline, property, and/or sales taxes to fund the implementation of ITS initiatives. This income may be combined into a general use fund to be used for various purposes. Alaska may also impose a number of user charges, fees, and taxes to generate revenue for implementing, operating, and maintaining ITS. User charges, fees, and taxes are collected from those who directly benefit from or are associated with using a specific publicly provided service. One example of this is the gas tax - drivers on public roadways pay for them through a tax on fuel. The amount paid is proportional to the amount of product or service consumed. A partial list of user charges, fees, and taxes that may be applied to state and local transportation systems includes:

- Motor vehicle registration fee
- Vehicle sales tax
- Certificate of title fee
- Weight-distance tax for commercial vehicles
- Vehicle inspection charge
- Motor oil tax and tire tax, etc.

Innovative Funding Mechanisms and Special Programs

"Innovative financing" refers to changing the traditional federal highway financing process from a single strategy of funding on a "grants reimbursement" basis to a diversified approach that provides new options. Many of the ideas discussed in this section come from the most innovative financing concepts developed in the public and private sectors. A prime objective of innovative financing is to maximize the states' ability to leverage federal capital for needed investment in transportation systems, and to foster the efficient use of funds.

Transportation Infrastructure and Finance Act (TIFIA) – The Transportation Infrastructure and Finance Act offers three types of funding that can be used by public or private entities to fund expensive transportation projects, including ITS. These funding options include: direct loans, loan guarantees, and lines of credit. Only ITS projects in excess of 30 million are eligible, however almost any project that costs over $100 million would likely be eligible. Additionally, the project must conform to the following conditions to be eligible for funding:

- Must support in whole or in part by user charges or other non-federal funding mechanisms.
- Must be included in the State's Transportation Plan.

Federal credit assistance may not exceed 33% of the total project cost.

More information on TIFIA can be found at:

http://www.fhwa.dot.gov/innovativefinance/brochure/credit.htm#3

State Infrastructure Bank - State Infrastructure Banks (SIBs) are revolving loan programs that can be created at the state or regional (multi-state) level. SIBs provide states with a wide range of loan and credit enhancement for eligible transportation projects. Eligible projects include transportation facility projects on the State Highway System or that provides for increased mobility on the State's transportation system. Under the SIB program, states are allowed to transfer a portion (up to 10%) of its allocated highway trust fund allocation to a SIB. The availability of Alaska's SIB funds may be limited due to the fact that much

of the original 2.5 million federal seed money has been loaned to the Whittier Project. It is anticipated that this money will be repaid through collection of tolls received from the project.

Barter

Barter has been used by other states to fund some ITS elements of projects. Barter allows agencies to exchange or trade assets (e.g., goods and services) without exchanging money. Often barter involves the exchange of undesired or excess assets with another organization in exchange for that organization's undesired or excess assets. By exchanging undesired assets, agencies can obtain assets they need without having to pay for them. If the organization involved can come to an agreement on the assets to be exchanged, it often results in a win-win situation for both parties. An example of this would be when the DOT allows the media to use their right of way to install cameras, in exchange for images or use of cameras. The cameras, which are purchased by the media, could be used to provide monitoring capabilities to the agency and traffic images to the public without the DOT incurring any cost. This may enable the ADOT&PF to provide additional services to the public without incurring additional costs. Similarly, the media benefits in that they are able to provide enhanced content to their website via the use of ADOT&PF right-of-way, which draws in additional viewers and advertising revenue.

Another example of barter is exchanging access to rights of way for communication bandwidth. This practice was popular in the 1990's as telecommunication companies were expanding their fiber and wireless networks. Public agencies, especially state DOTs, had attractive rights of way for the telecommunication providers who were willing to exchange fibers (lit or unlit), conduit, or bandwidth in exchange for using those rights of way to install fiber or wireless communication towers. Although the telecommunication companies have largely obtained the rights of way they needed, there may continue to be some opportunities in Alaska for this form of barter.

The ADOT&PF should determine the feasibility of using barter as a possible method of supporting ITS projects, since it is possible that Alaska state statutes may prevent barter from being used.

Partnerships

A public/private partnership is a business relationship between the public and private sectors. To a specific degree, both entities share responsibilities and the costs, risks, and rewards associated with delivering goods and/or services. From a transportation standpoint, a public/private partnership is a form of service delivery with a collaborative approach based on reallocating traditional responsibilities, costs, risks, and rewards between the public agency and private entities.

6.13 ITS Procurement

The term "procurement" can be defined as the set of activities that need to be performed to obtain a product (e.g., off the shelf hardware and software) or service (e.g., software development, operations, and maintenance). The procurement of ITS-related products or services differs significantly from that of typical road construction projects. This is primarily attributed to the rate of change, specifically technological change, associated with ITS technology. Because ITS-related technologies change at a rapid pace, ADOT&PF must remain flexible in how they procure ITS products and services. Typically, with road construction projects the ADOT&PF has a common specification from which to work when bidding projects. This is quite different for ITS projects, requiring that ADOT&PF develop specific procurement approaches for each ITS project, often times refining a selected approach many times for a given project.

There are several types of procurement practices, and depending on the ITS product or service being acquired and the institutional arrangements within the ADOT&PF, some types could be more appropriate than others. Selecting the most appropriate method, given certain circumstances will place ADOT&PF in the best position to successfully plan, design, implement, operate or maintain their ITS projects. However, determining which methods are best, given unique circumstances is a challenge.

6.13.1 Procurement Challenges

It can be very challenging for a transportation agency like ADOT&PF to procure ITS software and hardware. The challenge behind procuring ITS products and services is largely due to rapid advances in technology and the inability of agency staff to keep up with these advances. Methods (such as low-bid) that have traditionally been employed to procure transportation infrastructure (such as bridges and roadways) are not generally applicable to ITS hardware or software, due of the dynamic nature of ITS technology. For instance the specifications of ITS equipment may change so fast and drastically over the course of a project, that technologies desired at the start of project are no longer valid or desired at the end of the project. To this extent, one of the most common reasons for failed ITS software development projects is due to changes in project definition as a result of advances in technology. Additionally, these challenges could increase with the scope and complexity of the product or service being procured. With that said, there is no prescribed approach for procuring ITS projects as there might be for typical construction projects. ADOT&PF must use their understanding of procurement practices to derive at a procurement approach that best suits agency needs and places the department in the best possible situation to succeed in their efforts.

The challenges inherent to ITS procurement is lessened though, as ADOT&PF is experienced in procuring a variety of technologies and has used non-traditional methods for many of those procurements. Specifically, ADOT&PF has used criteria other than cost alone for procuring traffic counting systems and road-weather information systems. The agency also has access to the State's software Task Order System contract. The Task Order system is a method of obtaining information technology professional services without having to go through the normal solicitation process. Through the formal procurement method, the State's Enterprise Technology Solutions (ETS) has established contracts with vendors at highly competitive rates. The services covered by the Task Order System are broken into 13 different categories. The highest ranking contractor for that category has first rights to respond and provide a cost. The project manager reserves the right to accept or reject the offer. This is an efficient method of hiring a contractor than going through the traditional methods which can take much longer to process. This contract allows an agency to work with a software team that was chosen on the basis of qualifications. Generally, tasks are written to determine a detailed scope, and cost estimates are written to determine the effort.

The following discussion is meant to serve as a reminder to those who have used non-traditional methods to procure technologies in the past. For those who have not been involved with ITS or technology procurement, it documents some of these options.

6.13.2 Understanding Why ITS Procurement is Unique

Although there are no current procurement processes designed specifically for ITS, existing methods can be applied to better respond to ITS project needs. This section describes the reasons why ITS projects can have uncertain outcomes.

Maturity of the Technology

ITS technologies are relatively new and rapidly changing. In contrast, roads and bridges have been constructed for many years and have a long history of "lessons learned". For example, at its inception the ITS industry primarily focused on traffic operations applications. However, the industry has evolved to consider other application focus areas such as maintenance operations, which is a primary focus of ITS in Alaska. With this in mind, this trend of shifting focus to new applications is likely to continue in Alaska and elsewhere.

Because the technology planned for implementation at the beginning of an ITS project may change by the end, the outcome is not always certain. However, in contrast to roads and bridges (which take decades from concept to implementation), ITS can be implemented quickly – and should be, due to the rapid change in technology. Because the related technology changes so little, road and bridge projects can withstand a long implementation cycle. Many times, traditional transportation improvement and development projects have substantial impacts on the local community, and communities demand significant mitigation strategies that further slow down the project. ITS projects, on the other hand, generally don't have the level of impact that road/bridge projects have on communities, and are therefore generally immune to the same level of scrutiny from the external environment. The short cycle time required for ITS procurements requires responsive management and procurement processes.

Design Criteria and Standards

Because ITS is new and dynamic, relatively few design or process criteria and standards exist to guide its implementation. In contrast, significant design criteria and standards information is available for traditional transportation capital projects. This means that there are many more decisions required of the ITS design team than required for roads and bridges. Since there are a myriad of ITS options to choose from, outcomes are not certain. Many decisions are required, and with each new decision affecting each subsequent decision, the management processes for ITS must respond to an incremental implementation approach. This is not to say that each system recommended for implementation in Alaska is a new concept. As mentioned previously, ADOT&PF has been involved in previous ITS initiatives, such as those focusing on CVO and RWIS. However, it is understood that many of the systems recommended for implementation in Alaska are new concepts for ADOT&PF, and special care should be taken in developing design criteria and standards.

Ability to Innovate

Because the technology industry is constantly introducing new systems, software solutions, and systems concepts, ITS sparks our imaginations and spurs innovation. Alaska has moved forward in identifying innovative ways to procure technology-based transportation projects. This is reflected in their development and use of a task order contract to procure information technology projects.

These ITS project features are no different from technology projects implemented in other sectors. However, they are drastically different from traditional public sector transportation projects. Private sector organizations that focus on software, systems and technology implementations have developed specific procurement processes that are currently in place. Ideally, the public transportation sector would also adopt new procurement processes for ITS. However, the regulatory process often introduces major barriers to refining the procurement processes needed to respond to dynamic ITS projects.

Even without a more standardized procurement process for ITS, agencies can meet ITS needs by adapting elements of existing procurement processes that are already available to them. Most agencies are not

aware of the range of procurement strategies available to them, because they haven't encountered the more unusual circumstances that might require using them. The following section outlines procurement methods that are available to public transportation agencies across the U.S.

6.13.3 Procurement Activities and Practices

Procurement processes can be applied to products (e.g., software, equipment, etc.) or services. Services include:

- Planning and engineering services,
- Software development,
- System testing and integration,
- System maintenance, and
- TMC operations.

Typically, when services are procured they could be outsourced to outside contractors and administered by ADOT&PF staff.

Products include:

- Detectors
- Signals
- Computers
- Software (already developed)
- Poles, and
- System calibration and testing equipment

There are several practices available to ADOT&PF when procuring ITS products and services. Understanding these practices may reduce problems that often occur when an effective procurement approach is not used. These problems include but are not limited to:

- Projects being completed late,
- Projects not being completed at all,
- Projects that do not meet desired requirements or stated expectations, and
- Cost overruns.

Method of Award

When procuring products and services, ADOT&PF should first decide an appropriate method of awarding work to verify that agency needs are met and that there is adequate competition. The method of award answers the question "how should the contractor be selected?" It defines the criteria that are used to select a contractor to perform the work. There are several methods from which to choose, each with distinct differences that should be reviewed before a selection is made. The selection should in most cases be dependant on the type of work that is to be performed.

11.2.1.1 Cost-Only

A basic but common approach for awarding contracts is through the consideration of cost-only. This is commonly referred to as a sealed bid or low bid approach. Since cost is the only criterion taken into consideration, procuring agencies should consider this method when:

- Project specifications are completely known and deliverables are fixed and
- There will be at least two potential contractors bidding.

For many ITS projects, the consideration of cost-only is widely viewed as inappropriate. A cost-only approach could limit innovation, and may prevent contractors from discussing potential best solutions or how efficiencies could be captured by the project.

11.2.1.2 Qualifications

This method works best for software development or other types of services. Qualifications methods include:

- **Standard RFP** – This method begins with the issuance of a request for proposal (RFP). Proposals that are received are short-listed based on qualifications. After short listing, the contracting agency then requests interviews. Based on the information gained at the interview, a contractor is then selected. Only the contractor's approach, methodology, and qualifications are reviewed.
- **Competitive Design** – This method, unlike others, is paid for by the contracting agency and is only open to the number of contractors the agency selects, usually from an RFP, and pays for. Each contractor is paid to develop the system design and high-level functional requirements. When all documentation is submitted, the contracting agency selects the design it perceives to best address the needs and requirements set forth in the RFP and subsequent documentation.
- **Demonstrations and/or Site Visits** – Demonstrations and/or site visits may be used in conjunction with other methods, to verify qualifications stated by contractors. Demonstrations/site visits are usually conducted upon selecting finalists, but may also be used before a statement of work is complete to better understand and scope products/services.
- **Requirements Checklists** – Through this approach the procuring agency develops a list of requirements and then ranks each requirement from most needed to least, and then asks contractors to indicate which requirements their systems currently meet, those that they could meet with some modifications or enhancements, and those they can't meet. Based on the contractor response, a contractor is selected. In some instances, contractor responses are backed up with site visits to confirm responses. Procuring agencies should have a common checklist for reviewing each agency's systems to ensure fair competition.
- **Sole Source** – This method is the direct selection of a contractor, without competition. This method should only be used when desired products or services are available from only one source. Typically this method is used when the owner has knowledge of the contractor's reputation or has had a prior relationship with them.

11.2.1.3 Qualifications/Cost Combination

Some combination of qualifications and cost-based methods works best for procurements that are a combination of products and services.

- **Two-step Sealed Bids (Qualifications then Costs)** - As its name implies this method awards contracts in a two-step process considering first qualifications then costs. First, all technical proposals are reviewed and evaluated to determine if they meet the technical requirements of the statement of work. Proposals that are considered technically acceptable are then selected and carried forward to the second step. In step two, costs are reviewed and the lowest cost contractor is selected. This method gives ADOT&PF the advantage and benefit of selecting the lowest cost qualified contractor for projects without adequately defined specifications.
- **Competitive Proposals –** This method uses either a fixed-price or cost reimbursement contract as a base, but allows discussion between ADOT&PF and the bidding contractors. Therefore, this approach allows more subjectivity in evaluating proposals, in addition to costs and qualifications. This method also allows potential contractors to voice the reasoning behind their bids, which may ultimately help

the procuring agency arrive at a selection that offers the best product or service at the least cost. This method is similar to competitive negotiations, but does not include a negotiation.

- **Best Value –** This method uses a combination of qualifications and costs, and potentially other factors to derive at a "best value" offer. Therefore, this approach is often viewed as combination of a low bid and qualifications based bid approaches. A "best value" approach usually involves a formula where costs and qualifications each are assigned a percent of the total score. ADOT&PF can emphasize or deemphasize the importance of cost or qualifications by varying the percentage given to that particular category. For instance, if costs are considered more important ADOT&PF may assign 60% of the total score to costs and only 40% to qualifications.
- **Life-Cycle Costs** – For many ITS projects, the initial cost to develop and implement the system represents only a fraction of the total costs the project may incur over its designed life. The life cycle cost method of awarding contracts could result in awarding contracts based on the entire life-cycle costs of ITS. This approach should have particular importance to management and operations because it considers not only the cost to implement a system, but looks beyond this initial cost and takes into account the entire cost to implement, manage, operate, and maintain acquired products and services. This approach could give greater awareness of the actual costs associated with a project.
- **Best and Final Offers –** A Best and Final Offer (BAFO) is a technique that could be used by ADOT&PF to further negotiate bids after initial proposals are received. Typically, a BAFO request is only submitted to contractors still considered within the "competitive range" after initial negotiations. A BAFO allows contractors to revise their proposals to meet necessary technical specifications.
- **Competitive Negotiations** – This method is similar to competitive proposals; however, under this method ADOT&PF could negotiate terms of the contract with the selected contractor.

Contract Type

The contract type answers the question "how is the contractor paid or reimbursed for its services?" There are many methods from which the soliciting agency could choose. Selection of one method over another should be based on ADOT&PF policies as well as how the agency perceives that project risks could be allocated. Questions that ADOT&PF should consider before selecting a contract type include:

- Are there uncertainties in the work to be performed?
- To what degree could the agency deal with financial risks and cost over runs?

Based on the above questions, ADOT&PF should assign risks appropriately. ADOT&PF may select from the contract types described below. Generally speaking, contract types are described from least risky to most risky for the procuring agency.

11.2.2.1 Fixed Price

A fixed price contract states a single fixed price to complete and deliver specified products and services. The stated price does not fluctuate after the contract is awarded. Therefore, the ability to retain a profit could lie completely with the contractor. Since the contract price is fixed, it could be to the advantage of the contractor to continuously monitor project progress and complete work in an efficient and effective manner. With that said, this contracting method could give the contractor the potential for greater profit if work can be completed and delivered more efficiently. Conversely, if actual project costs exceed that stated in the contract, then the contractor could be at risk for profit erosion or worse, taking a loss on the project.

Fixed price contracts could work best for projects with fixed or known outcomes, and for when costs can be comfortably estimated. Fixed price contracts should not be used for new software products, but could be generally applicable to the procurement of commercial, off-the-shelf (COTS) products. Project specification should be clearly articulated and be as specific as possible to leave little room for interpretation as to what products and services will be delivered. Poorly written or vague language may cause ADOT&PF to accept proposals that result in the completion and delivery of products and services

that do not meet prior expectations. Because there may be inherent risks to the contractor, ADOT&PF should expect to receive proposals that may be higher in price to offset potential risks.

11.2.2.2 Cost Reimbursement

Cost reimbursement contracts reimburse contractors dollar-for-dollar the costs incurred as a result of completing and delivering products and services, so long as the work, which is completed, was approved by ADOT&PF. In addition to the actual cost incurred, the contractor also receives a fixed fee. Typically, the costs that can be reimbursed are capped at a maximum not-to-exceed amount to guard against risks associated with scope creep and extending schedules.

Cost reimbursement contracts generally work best for projects where products and services cannot be completely defined, or costs comfortably estimated. Cost reimbursement contracts could place more risks on ADOT&PF when compared to fixed price contracts. Risks could be minimized through the not-to-exceed price contract.

11.2.2.3 Time and Materials

Time and materials contracts are similar to cost reimbursement contracts in that they reimburse contractors for the costs incurred as a result of completing and delivering products and services. A primary difference between the two contract types, and a reason to select one over the other, stems from the ability to estimate the extent and length of work to be performed. Generally, a time and materials contract could be used when the extent and duration of the work to be performed cannot be easily estimated. Because of this, time and materials contracts are typically not capped, but rather paid based on mutually accepted, fully burdened hourly labor rates, and total direct or material costs. Because there is not a cap, these contracts could be viewed as riskier than fixed price and cost reimbursement contracts. With that said, ADOT&PF should closely monitor project progress and work activity to verify that these activities are being completed in a cost effective manner.

11.2.2.4 Incentive

Incentive contracts are essentially variations of the first two contract types (fixed price and cost reimbursement), that add incentives or penalties, which are tied to the successful completion of work. For instance, if the contractor completes work before the target date set by ADOT&PF, an incentive is awarded to the contractor. Conversely, if work is not completed by the target date, a penalty could be applied. The awarding on an incentive should be designed to encourage contractor efficiency when the project schedule is of critical importance.

6.13.4 Work Structure

The work structure, also commonly referred to as the contract form, answers the question “how is the work allocated to contracts? Depending on the type of project and the estimated work to be performed, one or more of the following types of work structures are typically used.

Single Phase/Single Step – A single phase (also referred to as single step) contract allocates the entire work to be performed in one phase or step. Since all the work is allocated to one step, there is only one contract. With that said, SDOT&PF should only use this work structure if confident that the contractor has a wide range of skills, and that those skills are sufficient to complete the work. Usually, single phase contracts are most appropriate for COTS procurements.

Multiple Contracts – This work structure is used when it is desired to have multiple contractors working on different elements of the same project at the same time. Typically, this is done when the project needs to be completed by a specific date and the project schedule is considered critical. It could also be beneficial for when significant outside experience is needed. Due to the involvement of multiple contractors however, this structure could be difficult to manage and could increase the administrative costs associated with the project. It may also result in finger-pointing by the different contractors when

the work from one contract does not match with the work by another contract. ADOT&PF has to assess whether or not the increased costs and added difficulties managing the project are worth the benefits gained in terms of the project schedule. Multiple contracts are perhaps best used for construction projects and may only be appropriate when there is very little (or no) linkage between the work of the two contractors.

Phased – Phased contracts allocate contract work into specific phases or "bite sized" pieces of work that could be more easily managed compared to a single phase work structure. Therefore, these contracts are more appropriate for longer (i.e., more than one year) and/or more complex procurements (i.e., not solely COTS procurements). In addition to being easier to manage, a phased work structure could allow project work to evolve over the course of each phase allowing the knowledge gained during the course of a phase to be incorporated into the following phase. Typically, work on each phase could not begin until formal notice is given to the contract to begin work. Phased contracts could also be used for large-scale projects that require funding from multiple budget periods. This may allow ADOT&PF to control their cash flow and determine when a particular portion of the work can begin.

Purchase Order – A purchase order is a form of sole-source contracting, which could be used for fixed price procurements that are relatively small in scale and which can be exercised is a short amount of time. For these reasons, purchase orders are applicable for many COTS procurements.

Task Orders – Task orders are similar to phased work structures in that they are beneficial for managing work that evolves over time. Therefore, this work structure could be good for projects that carry greater risks, and for when outcomes are unknown. Because outcomes are unknown the selection of task order contractors should not be based on low bids.

Combinations – Depending on the type of work to be preformed, it may be to the benefit of procuring agencies to use two or more of the work structures above to meet agency objectives and to limit costs.

6.13.5 Policy Considerations

Because most agencies have not developed appropriate policies and standards to guide ITS procurement, they often find that software deliveries fail to meet functional requirements, are over budget, and/or are delivered late. Because of this, software procurement policies need to rely on good management practices. ADOT&PF staff is familiar with the pros and cons of various procurement strategies, and has used a combination of qualifications/price method to select the RWIS contractor and traffic count vendor to provide hardware and software.

The Alaska procurement rules appear sufficiently flexible for deploying new approaches to procurement and contracting. Federal procurement requirements (applicable when federal-aid highway funds are used to procure future ITS projects) may be more restrictive. Generally, the FHWA has shown growing latitude in this area and sponsored national courses addressing the unique aspects of ITS procurement.